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# Psychological Bulletin

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## CONTENTS

*The Twenty-fifth Anniversary of the Southern Society for Philosophy and Psychology:* J. B. MINER, 1.

*General Review and Summary:*

*The Experimental Psychology of Motivation:* CHARLES M. DISERENS and JAMES VAUGHN, 15.

*Special Reviews:* 66.

*Notes and News:* 79.

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Vol. 28, No. 1 January, 1931

THE

PSYCHOLOGICAL BULLETIN

# THE TWENTY-FIFTH ANNIVERSARY OF THE SOUTHERN SOCIETY FOR PHILOSOPHY AND PSYCHOLOGY*

BY J. B. MINER

*University of Kentucky*

The silver wedding of this happy family was thought to call for observations on its flight by some sort of "sky-pilot." So far as I know the society contemplates no shift from plain thinking to lighter-than-air craft, or to machineless gliding. No Freudians are demanding a submarine adventure. That the call to officiate in the ceremony reached me was, I trust, not because of any preaching qualifications. I presume it was because an envelope of records recently came into my hands on the death this last year of the founder of this society, Prof. Edward Franklin Buchner. Few societies can so clearly trace their beginnings to one person.

There is something quite moving in the foresight of the man who negotiated this alliance between philosophy and psychology in the South. He not only grasped the need for this neighborly contact, but he was imbued with that rare historical and scientific spirit which made him preserve the original records. For the first five years Doctor Buchner was the secretary and treasurer of this organization and in 1910 became its president. Those of us who recall the admirable summary of *Ten Years of American Psychology* which he published in 1903, followed by annual Summaries in the PSYCHOLOGICAL BULLETIN, and all who have occasion to follow the early history of our science, are under a lasting obligation to him for these thorough and scholarly accounts of its progress. The South is especially indebted to him since the last twenty-six years of his

* Read at the 25th annual meeting of the Society at Nashville, Tennessee, April, 1930.

academic life were spent at the University of Alabama, and, after 1908, at Johns Hopkins. His pioneering spirit, his farsightedness, his organizing ability, and his breadth of interest brought him in contact with philosophy, psychology, and education.

Among his first records I find letters of congratulation and good will from the forefathers of philosophy and psychology in this country. These autographed communications include the following names of men who, we are to-day glad to recall, wished the Society a propitious honeymoon. They include William James, James McKeen Cattell, George Trumbull Ladd, George S. Fullerton, J. Mark Baldwin, Frank Thilly, Henry Rutgers Marshall, Livingston Farrand, James R. Angell, William G. Hammond, H. N. Gardiner, H. Heath Bawden.

The attempt to organize a southern society was started on February 8, 1904, when Doctor Buchner wrote to these men for advice as to the inauguration of such an organization, and as to its affiliation with the national societies. The American Psychological Association was then in its twelfth year and the American Philosophical Association in its third year. In this letter Doctor Buchner said that preliminary consultations in the South had indicated an "awakening interest" which made such a plan feasible.

A preliminary conference was held at the meeting of the Department of Superintendence of the National Education Association at Atlanta, Georgia, February 23, 1904, and it selected the first officers. The polymorphous titles of the nine men at this conference reproduce for us their academic environment at that time. Besides Doctor Buchner, who was then Professor of Philosophy and Education at the University of Alabama, there were James Mark Baldwin, Professor of Philosophy and Psychology from the recently reëstablished laboratory at Johns Hopkins; B. B. Breese, then Professor of Psychology and Ethics at the University of Tennessee; H. E. Brierly, then Professor of Experimental Psychology and Biology at Florida State College; A. C. Ellis, then Adjunct Professor of the Science and Art of Education at the University of Texas; A. R. Hill, then Dean of the Teachers' College at the University of Mississippi; R. P. Halleck, then Principal of the Boys' High School at Louisville, Kentucky; W. Rose, then Professor of Philosophy and Education at the University of Tennessee, soon to be Dean of Peabody Normal College; and William T. Harris, then United States Commissioner of Education. Professor Baldwin was chosen for the first President.

Philosophy, psychology and education thus provided the setting

for a matrimonial triangle. A quarter of a century has, however, passed without a divorce in the family. The trial marriage proved satisfactory and fertile. On its first meeting, December 27, 1904, 36 charter children were born into the family. It now numbers 82 in good standing. At one time or another there have been about 300 different members enrolled. Only one charter member remains on the membership list to-day and he is our President, Max Meyer. Others among them affiliate when the Society meetings are nearby.

The first printed program of the Society announced the "First Annual Meeting" of the Society at Johns Hopkins University on December 27, 1904, with eight papers in the afternoon, after a luncheon at the home of Professor and Mrs. Baldwin. In the evening and the following two days the Society met jointly at Philadelphia with the American Psychological Association, the American Philosophical Association, the American Society of Naturalists, and affiliated societies. It is important to note that the constitution of the Southern Society was adopted at this meeting.

This date of the constitution raises an interesting biological and genealogical question: When was the birthday of the Society? Doctor Buchner's minutes and the published news note in the PSYCHOLOGICAL BULLETIN stated that the Society was "organized" February 23, 1904. They were accompanied by a list of the officers. If this was its birthday, then last year's meeting, and not this one, marked the twenty-fifth anniversary. To make this 1930 meeting respectable as the twenty-fifth anniversary, we should consider the meeting in February, 1904, from the biological viewpoint. Thus thought of, it marked the time of conception and the December, 1904, meeting, the birthday of the Society. During those ten months the Society was in embryo, developing a constitution which was adopted in December. With our birthday in December it is excusable for the Society to postpone its annual celebrations to the following spring as has been done since 1915. Social babies are not always particular to keep to the calendar dates of their first formal appearance.

The background of the South of that early time against which this Society stands out is described in a newspaper announcement of this first real meeting at Johns Hopkins in December, 1904. It was written for the *Atlanta Journal* by a charter member, Dr. Haywood J. Pearce, then Professor of Psychology at Brenau College, Georgia. He said: "Stunned by the blow received in the early sixties, our educational institutions for the most part have lain dormant, satisfied if the educational fires already lighted could be kept burning. Until

very recent years no new departments were organized, no improved educational methods were recognized, no advanced or revolutionary ideas were tolerated."

Doctor Pearce confessed that his own undergraduate training consisted of Mahan's "Mental Philosophy" and Jevon's "Primer of Logic." Mind, he said, was described as "an entity, consisting of three faculties, viz., intellect, sensibility, and will." He "did not know that there was such a man in the world as William Wundt, or that such a thing as a psychological laboratory was in existence. The doctrine of evolution was known only by reason of fiery invective and denunciation as a doctrine likely to corrupt our age." No wonder this psychologist exclaimed: "The organization of this Society marks an epoch in the intellectual growth of the South." The change in our environmental surroundings since then has certainly been pronounced. So much so that two years ago the legislature of Kentucky decreed that the license plates on automobiles should carry the word "progress"—surely an emergent motto.

In viewing the years that have passed, it would be difficult to distinguish the development of philosophical and psychological thought in the South from that in the country as a whole. I shall not attempt it. Instead, we may compare the academic and professional standing of these subjects in the South* to-day with that of earlier times. A number of tables have been prepared in which an attempt is made to utilize descriptions of southern psychology appearing as parts of earlier accounts. The tables are self-explanatory. You can draw conclusions from them as well as I. Let me call attention to only a few of the outstanding points.

The most striking statement, which I wish to offer as a matter of congratulation on this quarter-century celebration, is that the development of psychology in the South to-day is, in its quantitative aspects, on a par with that in the whole country twenty-five years ago. This applies to the number of "Professional Psychologists" and of their

* The ambiguity of the term "South" cannot be entirely avoided since some authors do not indicate what states they include. The United States census includes under the South Atlantic Division: Delaware, Maryland, the District of Columbia and south; under Southeast Central: Kentucky and south; under Southwest Central: Arkansas, Oklahoma and south. The Association of Colleges and Secondary Schools of the Southern States included as members in 1929; Johns Hopkins and Goucher College in Maryland, then colleges in Virginia and south; West Virginia University, Bethany and Marshall College, West Virginia, then colleges in Kentucky and south; Missouri University, then colleges in Arkansas, Oklahoma and Texas. As far as possible, the tables accompanying this paper indicate what regions are included.

publications, as shown by Table I, and to the laboratories in the United States then and in the South now, as shown in Table II. There are also many more independent departments of psychology in the South, at least fifty, and more men holding professorial rank in this subject than in the entire United States at the time of our birth. Possibly the same holds for philosophy although I have not found the data.

Both philosophy and psychology have been more than holding their own as measured by the proportion of members of their professional associations working in the South. The institutions in the South have a creditable record in the number of men they have inspired to go into psychology as indicated by bachelor's degrees taken here by members of the American Psychological Association, as well as by those taking a southern Ph.D. These both have doubled in the last ten years. However, there are more recognized psychologists at work in the South than the total its institutions have inspired or trained.

So far as research and instruction by members of the national psychological association are concerned there is apparently less interest in philosophy among those from the South than in the association at large. On the other hand, the subjects of papers before this society indicate a significantly larger proportion on topics of theoretical and general interest than in the early A.P.A. programs. Experimental papers before this society are relatively less frequent and applications of psychology more frequent than in the early days of the A.P.A. Nevertheless, about a fifth of the papers on our programs have been experimental.

I should like to recall that the object of this society, as stated in its amended constitution, is to promote the interests of "philosophy, psychology, and experimental education in the southern section of the United States." At the 1915 meeting it was suggested that the name be changed to include experimental education, but this was modified by adding this objective to its aims.

If we turn to the influence of the Society as an organization, we can extend felicitations on at least two noteworthy achievements. It stands out as a unique adventure in this country when philosophy and psychology were united in one society. The American Philosophical and the American Psychological Associations each has its own divisions in the West, Mid-West, and East. In the South these interests have the distinction of living together in peace and prosperity. This betokens the hospitality for which the South is famous.

At one of the early meetings of the Southern Society Professor James G. Hume, of the University of Toronto, stated the desirability of this coöperative attitude in an epigram which might well be preserved as a motto for the Society. I quote: "Psychology without philosophy is blind, philosophy without psychology is empty." That our discussions have kept the members broader and saner, few will doubt. If we have lost something by less emphasis on the minutia of technique, we have gained immeasurably more in appreciation of our confreres and the joy of living together.

The other achievement in which the Society is unique and in which we may take pride, has been the systematic attempt to raise the qualifications for teachers of psychology. In 1926 the Society set its approval on the transfer of credits for beginning courses in southern colleges only when taught by a member of the faculty who held at least a master's degree with a major in psychology; and for advanced courses only when taught by a person with training equivalent to a doctor's degree with a major in psychology. A standing committee has coöperated with southern colleges in preparing a list of institutions and courses meeting these conditions. It is to be hoped that similar action may be taken in regard to courses in philosophy, which a committee of the Society is now investigating. This attempt at standardization of instruction has met hearty approval in other sections of the country.*

As we look to the future, other needs of the South and other opportunities to advance our aims will present themselves. Wherever organized effort might help, the Society will be found ready. It would be pleasant to list the achievements of individual members, but this is not the time for that. It may be noted, however, that the movement for a National Institute of Psychology, including its recent incorporation, originated with one of our members, Dr. Knight Dunlap.

If I might venture, I would close by leaving another problem for your consideration. I do not know whether you have felt the danger that development brings on account of the multiplication of subjects

* See Peterson and Dunkle. Dean Haggerty recently found among 236 teachers' colleges in the United States only 24 which had a member or associate member of the A.P.A. on their faculties. Jarrett found only 20 among 167 teachers of psychology in 61 degree-giving state normals or teachers' colleges in the country at large who met the standards of the Southern Society for advanced courses. (R. P. Jarrett, Status of Courses in Psychology in State Teachers' Colleges in the U. S., George Peabody College for Teachers, Contrib. to Educ., 1928, No. 47, p. 135.)

of research, new courses of study, new college departments, and new colleges. This Southern Society may be peculiarly fitted to counteract such centrifugal forces which tend to blow our academic world to bits. Does not a center of interest in man and in our philosophical foundations suggest that we might be in an especially favorable position to further coöperative effort on any campus? This would be particularly true in regard to research and graduate work. Biological and social sciences, philosophical understanding, and the professional adaptation of science to education, medicine, law, commerce, etc., seem, at times, to be going astray because they lose contact.

TABLE I

"Professional Psychologists," *i.e.* Ph.D. members of A. P. A. giving full time to teaching in U. S. in 1906 (Franz), and the same for those in Southern states (U. S. census and Missouri) in 1929 (Miner).

| | No. of Publications | Number | |
|---|---|---|---|
| U. S. 1906 | 61 Psychol. Index | 44 | Members |
| South 1929 | 47 Psychol. Abstracts | 41 | Members |
| | 17 Abstracts | 25 | Associates |

TABLE II—Laboratories.

| | |
|---|---|
| SOUTH 1929 | In the Southern Association of Colleges at least 29 offered a three-semester-credit course in Experimental Psychology. (Miner)<br>24 had annual departmental budgets of $7,000 or more (Cattell).<br>Garvey lists 18 laboratories in the South. |
| 1915 | Among 60 Southern Colleges and Normal Schools, Barnes found 19 laboratories, 8 with equipment of $1500 or more. |
| 1904 | Garvey lists only 5 laboratories founded in 1904; Hopkins, Catholic University, Texas, Missouri, and Tennessee. Miner also listed Randolph-Macon. |
| U. S. 1904 | Miner lists 34 laboratories with equipment of $1000 or over, and only 14 with equipment over $2000.<br>Garvey lists 52 of the present laboratories as having started by then. |

Peterson in 1926 found only four laboratories in 20 Teacher Training Institutions in the South with annual laboratory funds of $500 or more.

The organization of the Institute of Human Relations at Yale, the establishment of an Institute of Psychology at the Sorbonne, and the inclusion of the department of psychology in both the biological and social science groups at the University of Kentucky, have recently brought this unique position of our common interests to my attention.

Questions of scientific method, of logical thinking, of fundamental assumptions, and of the science of human activities are common to many efforts. The demand for specialists disregards the hazard of scattering. Progress seems to require not only specialization but also organization. Might not group deliberation by this Society or initiative toward securing more coöperation be worth while? I leave the question with you for contemplation, or, if you like, for discussion.

TABLE III

Influence of the South on Psychological Training of A. P. A. Members.
Number of institutions in the South (U. S. census) from which members of A. P. A. in 1921 received their bachelor's or doctor's degrees (Fernberger), compared with members and associates in 1929 (Miner).

| | | |
|---|---|---|
| 1921 | Bachelor's Degrees 31 (9%) | Doctor's Degrees 22 (6%) |
| 1929 | Bachelor's Degrees | Doctor's Degrees |
| | Members, 33 (6%)..... | .....25 (7%) |
| | Associates, 36 (10%)..... | .....15 (4%) |
| | Total....69 (9%)..... | .....40 (4.5%) |

TABLE IV

Members American Philosophical Association and American Psychological Association living in the South (U. S. census and Missouri).

| | | | |
|---|---|---|---|
| Philosophical Association | 1909 | 18 | (10%) |
| | 1929 | 51 | (11%) |
| Psychological Association | | | |
| Members..... | 1915 | 29 | ( 9%) |
| Members..... | 1929 | 74 | (14%) |
| Associates..... | 1929 | 47 | (13%) |
| Total..... | 1929 | 121 | (14%) |

TABLE V

Catalogues of 108 colleges, 18 Teacher Training Colleges and 12 Junior Colleges in the Southern Association of Colleges (1929).

*Philosophy*

Semester Credit Hours in Courses

| History of Phil. | Ethics | Logic | Introductory | Problems of Philos. | Philos. of Relig. | Misc. |
|---|---|---|---|---|---|---|
| 278 | 216 | 152 | 136 | 54 | 46 | 174 |

Names of Departments

| Philosophy | Philos. & Psy. | Philos. & Ed. | Philos. & Religion | Education | Sociol. | Phil., Psy. & Ed. |
|---|---|---|---|---|---|---|
| 56 | 14 | 5 | 9 | 1 | 2 | 1 |

In the Teacher Training Colleges and Junior Colleges there were also 20 semester hours in all philosophy courses offered.

*Philosophy and Psychology.*

Titles of Teachers of Philosophy and Psychology.

| | Professor | Associate Professor | Assistant Professor | Instructor | Fellow | Ph.D. |
|---|---|---|---|---|---|---|
| Colleges | 168 | 17 | 39 | 32 | 5 | 128 |
| T. T. Col. | 19 | 6 | .. | 2 | .. | 7 |

Names of Departments in which Psychology is given.

| | Psy. | Ed. & Psy. | Psy. & Phil. | Phil. & Ed | Agr. or Rural Ed. | Ind. Ed. | Psy. & Soc. | Phil. | Ed. | Phil. Psy. & Ed. |
|---|---|---|---|---|---|---|---|---|---|---|
| Colleges..... | 43 | 24 | 14 | 5 | 3 | 1 | 1 | 9 | 3 | 1 |
| T. T. Colleges.... | 3 | .. | .. | .. | .. | .. | .. | .. | 15 | .. |
| Junior Colleges... | 5 | .. | 1 | .. | .. | .. | .. | .. | 6 | .. |

TABLE VI

Catalogues of 108 colleges, 18 Teacher Training Colleges and 12 Junior Colleges in the Southern Association of Colleges (1929) Catalogues of other colleges, 1 teacher training college and 4 junior colleges in the Association were not available.

Semester Credit Hours in Courses in Psychology.

| | Introd. or Gen. Psy. | Ed. Psy. | Exper. Psy. | Social Psy. | Child. & Adol. | Mental & Ed. Tests | Abnorm. Psy. | Advanced Psy. | Applied Psy. | Learning | Psy. of School Subjects | Problems in Psy. | Research in Psy. | Statistics | Systematic Psy. | History of Psy. | Miscellaneous |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| College | 355 | 162 | 140 | 137 | 132 | 111 | 103 | 118 | 70 | 38 | 33 | 28 | 19 | 20 | 20 | 21 | 203 |
| Teacher Training Colleges | 40 | 49 | 2 | 2 | 48 | 7 | 1 | 12 | 4 | 5 | 22 | .. | .. | .. | .. | .. | 9 |
| Junior Colleges | 35 | 14 | .. | 6 | 6 | .. | .. | .. | 6 | 2 | .. | .. | .. | .. | .. | .. | 3 |

Report of the Committee of the Southern Society of Philosophy and Psychology on Approved Courses. Among 163 institutions in the South which reported, only 51 fully qualified for all courses offered and 40 more for the beginning courses; only 91, therefore, gave any approved courses.

*Early Instruction in Psychology*

In 1904 in the U. S. among 150 colleges, only 4 had separate departments of Psychology; only 34 had professors or assistant professors with their titles in Psychology.

In 1905 in the South, among 60 colleges, only two had professors of Psychology, only two had separate departments of Psychology, and only two offered graduate work in Psychology. (Barnes).

TABLE VII

Subjects of instruction by members of the American Psychological Association and those in the southern states (U. S. census) for 1920 (Boring). Members and associates for the same states 1929 (Miner). Fractionated for each member.

| | Psychology | Applied Psychology | Education | Philosophy | No Instruction | Total |
|---|---|---|---|---|---|---|
| U. S. 1920..... | 170.9 | 43.3 | 44.5 | 50.3 | 72 | 391 |
| South 1920..... | 20.2 | 4.7 | 5.0 | 5.0 | 10 | 45 |
| South 1929..... | 72 | 9 | 7 | 3 | 19 | 110 |

PRESIDENTS AND SECRETARY-TREASURERS OF THE SOUTHERN SOCIETY FOR PHILOSOPHY AND PSYCHOLOGY

*Presidents*

J. Mark Baldwin, Johns Hopkins, 1904–1907.
J. MacBride Sterrett, George Washington University, 1908.
Albert Lefevre, University of Virginia, 1909.
Edward F. Buchner, Johns Hopkins, 1910.
Shepherd I. Franz, St. Elizabeths Hospital, 1911.
Robert M. Ogden, University of Tennessee, 1912.
H. J. Pearce, Brenau College, Ga., 1913.
J. B. Watson, Johns Hopkins, 1914.
J. C. Barnes, Maryville College, Tenn., 1915.
David Spence Hill, University of Alabama, 1917.
E. K. Strong, George Peabody College, 1919.
Knight Dunlap, Johns Hopkins, 1920.
John M. Fletcher, Tulane University, 1921.
Joseph Peterson, George Peabody College, 1922.
H. C. Sanborn, Vanderbilt University, 1923.
Buford Johnson, Johns Hopkins, 1924.
J. F. Dashiell, University of North Carolina, 1925.
J. B. Miner, University of Kentucky, 1926.
A. S. Edwards, University of Georgia, 1927.
Josiah Morse, University of South Carolina, 1928.
R. L. Geisler. Randolph-Macon College, 1929.
Max F. Meyer, University of Missouri, 1930.

*Secretary-Treasurers*

Edward F. Buchner, University of Alabama, 1904–1909.
R. M. Ogden, University of Tennessee, 1910–1911.

## TABLE VIII

Research subjects of U. S. members of the American Psychological Association and those in the southern states (U. S. census) for 1920 (Boring), and members and associates for the same states 1929 (Miner). Fractionated for each member.

| | Philosophy | Aesthetics | Anthropology | Physiology and Neurology | Psychiatry | General | Abnormal | Psycho-Pathology | Applied | Tests | Statistics | Industrial | Clinical | Educational | Social | Animal | Experimental | Theoretical | Miscellaneous | No Research | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U. S. 1920 | 15.7 | 1.7 | 2.6 | 4.2 | 2.5 | 8.7 | 7.2 | 7 | 10.7 | 53.9 | .7 | 7.4 | 13.7 | 46.2 | 6.1 | 15.5 | 80.8 | 37.4 | 5 | 53 | 391 |
| South 1920 | 1.5 | .. | 1 | .5 | .. | .5 | .. | 4.5 | 1.8 | 4.2 | .. | .3 | .8 | 5.8 | .3 | 4.0 | 9 | 2.8 | 1 | 7 | 45 |
| South 1929 | .. | .7 | .. | 2.1 | 1.6 | 3.6 | 2.1 | 2.9 | 2.5 | 12.7 | 7.2 | 3.2 | 4.8 | 11.5 | 3.5 | 2.6 | 20.6 | 2.0 | 13.5 | 13 | 110 |

TABLE IX

Subjects of papers on the programs of the A. P. A. for the first ten years, 1892-1901 (Buchner) compared with those of the Southern Society (Miner), 1904-1917 (138 papers) and 1923-1929 (136 papers).

| Buchner | No. | % | Psychol. Abstracts (Miner) | 1904 1917 | 1923 1929 |
|---|---|---|---|---|---|
| Historical | 12 | 4% | General | 10 | 1 |
| Theoretical | 25 | 9% | General | 21 | 22 |
| Descriptive | 13 | 8% | Nervous and mental disorders | 3 | 0 |
| | | | Special mental conditions | 19 | 6 |
| | | | Social functions of the mind | 1 | 8 |
| Physical & Physiological | 20 | 7% | Nervous system | 3 | 4 |
| Experimental | 86 | 30% | Motor Phen. & Action | 3 | 5 |
| | | | Sensation & perception | 14 | 4 |
| | | | Feeling & emotion | 2 | 4 |
| | | | Attention, memory & thought | 5 | 4 |
| Precision of apparatus shown or described | 28 | 10% | General | 0 | 5 |
| Comparative | 7 | 3% | Plant & Animal Behav. | 9 | 1 |
| Genetic | 25 | 9% | Evolution & heredity | 4 | 3 |
| | | | Childhood & adolescence | 6 | 4 |
| Pedagogy & applications | 12 | 4% | Educational Psychol. | 17 | 28 |
| | | | Indust. & Personnel Problems | 2 | 13 |
| | | | Mental Tests | 7 | 12 |
| Philosophical | 34 | 12% | | 12 | 9 |
| Discussions with naturalists | 4 | 1% | | 0 | 0 |
| Miscellaneous | 7 | 3% | Biometry & statistics | 0 | 3 |
| TOTAL | 283 | 100% | | 138 | 136 |

W. C. Reudiger, George Washington University, 1912–1914.
L. R. Geissler, Randolph-Macon College, 1915–1917.
H. W. Chase, North Carolina University, 1917–1919.
S. C. Garrison, George Peabody College, 1920–1922.
O. R. Hughes, West Tennessee Normal, 1923–1925.
J. A. Highsmith, North Carolina College for Women, 1926–1928.
P. L. Boynton, University of Kentucky, 1929–1931.

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# THE EXPERIMENTAL PSYCHOLOGY OF MOTIVATION

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Observations of a semi-controlled nature in the field of motivation may without doubt be traced back to the earliest age of humanity. Even before the advent of the professional moralist, practiced men of affairs—chiefs, priests, and law givers—were utilizing definite motives for controlling the behavior of the members of their communities. Reward, punishment and prestige as motives were practically recognized for they were employed on a large scale in the initiations which form the basis of primitive education and in the customs and codes which constitute primitive law. Children were usually subjected to a variety of painful experiences before becoming responsible adult members of the tribe. They were subjected to fasts, man-handling, mutilations and fright as a means of modifying original nature to conform to tribal pattern (**68, 109, 139**). This habit apparently persisted into late historical times, and even to-day in some quarters we find a remnant of it (**128**). Doubtless for similar reasons early codes of law and the unwritten customs which precede them, stress physical discomfort or the threat of it as a means of persuading members of the community to obey the laws (**99**). It is significant to note that the farther back we go the more severe are the penalties threatened or actually employed in the case of infraction. We may compare, for example, the early Athenian Code of Draco with the more humane legislation of Solon. Early Sumerian Law is more drastic than later Babylonian Law. It would be tempting to explore the field of this early practical rule of thumb psychology and in particular the body of evidence back of it, but we will reserve the task for a subsequent article and proceed to the contributions of modern science.

One of the earliest laboratory experiments that bears directly on the problem of motivation was reported by Elmer Gates in 1895 (**61**). He trained a group of puppies in the visual discrimination of colors using as incentives, food and electric shocks. A hall leading to the laboratory was covered with colored metal squares each insulated from the rest. Squares of a certain color were connected with an induction coil and they were so arranged that the puppies might

jump from one square to another of the same color without receiving a shock. An attentive puppy after several experiences learned to avoid the shock by stepping on the appropriate squares. Gates also offered food as an incentive (to the learning of colors) by placing meat under an inverted pan of specific color placed among pans of various colors. In this case also the puppies learned to react to the selected color. Thus Gates really compared incentives but does not state which was more effective.

The method developed by Gates soon spread to psychological and biological laboratories all over the world and was applied to the study of animal organisms of every type. Most of this work properly belongs to a study of incentives in the narrower sense, yet considering the broad definition of motivation recently accepted by psychologists (**9, 12, 78**), even such a study as that of Jennings (**93**), where the avoiding reactions of protozoa are studied by means of the electric current, may be regarded as throwing light on the elementary factors in motives. A few of these studies will be cited but we shall confine ourselves, in general, to studies of more advanced animal forms and in particular to the studies which have as their specific aims the discovery of facts bearing directly on the problems of motivation.

## Experimental Studies of Motivation

### *General Classification*

An excellent classification of the experimental studies of motivation, and one which serves to-day as well as in 1924, is given by Simmons (**158**). She writes:

"The literature containing some reference to the use of incentives in animal learning may be classified under three heads:

"1. Experiments in which incentive was considered only incidentally as a necessary means of controlling the training.

"2. Experiments testing the relative effectiveness of different intensities of the same incentive.

"3. Experiments testing the relative effectiveness of different incentives, or a combination of incentives as compared with one alone" (p. 2).

For the purpose of the present study we shall divide the third class into comparative studies, and let this class represent the fourth division in our outline, and studies of the effectiveness of different combinations of incentives. The latter will represent our third division.

"Under the first heading we may include all experiments in animal learning with the exception of those few which may be classed under our second, third, *and fourth divisions.* There we find the incentives employed varying with the particular bias of the experimenter as well as with the species of animal and the nature of the problem. These incentives cannot be compared with one another as to effectiveness, since other conditions vary from experiment to experiment. *Such stimuli as food, sex, nest and eggs to which the animal reacts positively; and escape from confinement, extremes of temperature, and the electric shock to which the animal reacts negatively have been used"* (p. 2).

"Experiments falling under the second heading take the factor of incentive as their main problem. . . . These experiments are concerned with a comparison of the effectiveness of different degrees of the same incentive or rather a comparison of different incentives, *since the quantitative variation would doubtless produce a new incentive.* The view advanced by Yerkes (see "The Dancing Mouse" bibliography in Simmons, 19) that the method of punishment is more satisfactory than that of reward as a method of motivation led to several investigations on the use of the electric shock" (p. 3). *These investigations in turn led to similar investigations on the use of food and sex objects, and other stimuli.*

The third heading includes those studies which have combined two or more stimuli and compared the effectiveness of the combination with the effectiveness of a single stimulus.

The fourth class of investigations includes the studies in which the primary concern was to compare the effectiveness of different stimuli. The more important comparisons include those between the electric shock, food, and sex.

### *Methods*

The methods employed in the experimental study of motivation have been summarized in general by Warner (Sex Behavior, *Comp. Psychol. Monog.*, 4).

"The scattered experiments bearing upon animal drives have made use of four methods. The first studies the effect of various incentives, positive and negative, upon the rate of learning. Simmons (158) has reported such an experiment. The second correlates the physiological condition of the animal with the amount of spontaneous activity. Wang (196) for example, has found a definite relation between the oestrous cycle in the white rat and the

amount of general activity by means of this method. The third method has been called the choice method since it makes note of the behavior of the animal when faced with the stimuli related to two different drives. Tsai (184) has compared the hunger and sex drives by this method. The fourth method has been designated the obstruction method since it involves observation of the behavior of the animal when the attainment of the stimuli related to the drive is hindered by some obstruction or obstacle" (p. 4).

## 1. *Individual Incentives*

### ELECTRICAL SHOCKS

The electrical shock has been used quite extensively in biological and psychological laboratories as a motivating stimulus in studying the behavior of lower forms of animal life. In a great many of these studies, however, the shock has been used only as a device for motivating a form of behavior the experimenter wished to study. Yerkes (232), for example, investigated the associative ability of the earthworm by means of the electric shock. In this study the behavior of one worm in a T shaped labyrinth with one entrance and two exits was observed daily. One of the exits led to a tube of moist blotting paper, and the other led to an electric shock over a path of sand paper. The worm learned to avoid the sand paper and electric shock but never achieved a perfect score. Similarly Turner (185) and Szymanski (171) employed electrical punishment in studying the behavior of cockroaches. Szymanski used the electric shock in teaching roaches to avoid darkness and to seek light. Turner's investigation was similar in aim but more elaborate. Such studies as these throw light on the elementary factors in motivation, as has been pointed out, and for this reason should not be entirely disregarded in a review of the experimental literature on motivation. They definitely classify electrical punishment as a motivating condition, and suggest the possibility of an optimal intensity for this stimulus.

### STUDIES OF DIFFERENT INTENSITIES OF ELECTRICAL SHOCK

The foregoing investigations may with some qualification be said to constitute the first stage in the experimental attack on the electrical shock as a motive. As a group they were primarily concerned with the electrical shock stimulus as a motive insofar as they may be said to belong to the experimental literature on motivation. It is evident, however, in the various results that attention

was becoming focused on the effects of different intensities of this stimulus.

One of the earliest studies bearing directly on this problem, the optimal intensity of shock, is the study reported by Yerkes (**227**). The learning ability of the common green frog, Rana Clamitans, under different intensities of electrical shock was observed. The effects noted were as follows: (1) delayed volitional or deliberate reactions to weak shocks, (2) "instinctive" responses to shocks of intermediate intensity, and (3) spinal reflexes to strong shocks. Somewhat later Schaeffer (**152**) studied the effects of the same motive on the eating habits of the frog. Earthworms were placed in circuit with an inductorium so that the frog received a shock when the worm was taken into the mouth. The frog refused to eat the earthworms for a period of seven days after it had received a shock. Similar experiments with turtles have been made.

An experiment that may be placed in the same general class was conducted by Casteel (**31**). Turtles of the species chrysemys marginata were motivated by the electric shock to form certain discriminations. They reacted in diverse ways to the shock. After a few experiences, some became so nervous and wild that their withdrawal from experimentation was necessary. Others were affected in a similar way at first but gradually became adapted to the shock or reacted favorably under reduced stimuli. Some became sulky, refusing to approach the boxes, or even to leave the entrance room. Some, after each shock, would dart back quickly, turn and scurry away from the box, but they were apparently eager to repeat the experiment. Others would withdraw slightly from the electrode but would soon try the same box again or move slowly to the other box. These individual differences illustrate admirably the fluctuation in motivating power which may occur during the experimental use of any single incentive.

Yerkes and Dodson (**229**) carried the inquiry concerning the optimal intensity of the electrical shock much further in their experiment on the dancing mouse. These experiments undoubtedly constitute the first systematic investigation concerning the relation of intensity of electrical shock to its efficacy in controlling behavior. The mouse, in this study, was given the task of discriminating between two boxes of different light intensities. The light intensities were so arranged as to provide three degrees of difficulty in discrimination. For each degree of difficulty three intensities of shock were used. The aim of the study was to discover the effects of various intensities

of shock on the performance of tasks of different degrees of difficulty. The authors draw the following conclusions: The relation of the strength of electrical stimulus to rapidity of habit formation depends on the difficultness of the habit, or upon the conditions of discrimination. When the boxes vary greatly in brightness and discrimination is easy, the rapidity of learning increases as the strength of the electrical stimulus is increased from the threshold of stimulation to the point of harmful intensity. The results do not represent the point at which rapidity of learning begins to decrease for the experimenters did not care to subject the animal to injurious stimulation. When the boxes differ but slightly in brightness and discrimination is very difficult, rapidity of learning at first rapidly increases as the strength of the stimulus is increased from the threshold, but beyond an intensity of stimulation that is soon attained it begins to decrease. Both weak and strong stimuli result in slow habit formation. A stimulus whose strength is nearer to the threshold than to the point of harmful stimulation is most favorable to the acquisition of a habit.

Experiments similar in aim have been reported by Cole (36) and Dodson (49). In Cole's experiment Barred Plymouth Rock chicks were confronted with two screens, one light, the other dark. The chicks were given the task of discriminating between the screens. In one experiment the condition of discrimination was easy; in another medium; and in a third, difficult. For each condition of discrimination the chick was given a shock in case it chose the lighter passageway. Five intensities of shock were used in successive experiments. The conclusions Cole draws from the results of the experiment are sufficiently important to quote:

"It is evident that within the limits of the stimuli which I used, the number of trials required by the chick to learn to choose consecutively the darker of two unequally illuminated screens, when discrimination is easy, decreases with an increase of stimulus. Under medium difficulty of discrimination the above law holds true only for the lower intensities of the stimuli which were used, or in other words, the optimal stimulus recedes toward the threshold from 590 to 480 units. The above law for the condition of easy discrimination holds true for that of difficult discrimination if we consider only the records of the chicks which succeed in learning to make the discrimination . . . with the difficult condition of discrimination, strong stimuli divide the chicks into two groups, those which succeed in learning to discriminate by reason of more right choices at the beginning of the training series and consequently fewer pain stimuli,

and those which fail because of fewer right choices and more pain stimuli in the earlier trials . . . on the average the more sensitive chicks learned more rapidly both for strong and for weak stimuli." For easy discrimination, increases in the intensity of the stimulus are followed by increase in learning rate, while for medium discrimination an optimal intensity of stimulus is found, increase beyond which is followed by slower learning.

Dodson compared habit formation in visual discrimination under different intensities of electrical shock in the case of the kitten. Two intensities of shock, medium and strong, and three degrees of difficulty in visual discrimination were used. He concludes " (1) The rapidity with which kittens acquire the habit of always choosing the light box may be seen from the following results: under fairly difficult conditions of learning, with a medium stimulus, it took on the average 82.5 trials for the kitten to perfect a correct habit, and with a strong stimulus 105.7 trials; under less difficult conditions it took 60 trials with a medium stimulus, and 55 trials with a strong stimulus; and under fairly easy conditions it took 75 trials with a weak stimulus, 50 trials with a medium stimulus, and 35 trials with a strong stimulus. (2) The relation of the painfulness of the electrical stimulus to the rapidity of habit formation depends upon the difficultness of the visual discrimination. (3) When the discrimination is difficult the medium strength of stimulus was found to be the more favorable to habit formation, but when the discrimination is less difficult the difference between the unpleasant and the very unpleasant stimuli is not marked. When the discrimination is easy the rapidity of habit formation increases as the unpleasantness of the stimuli is made greater at least within certain limits."

The results of the foregoing experiments, reinforced by the results of experiments yet to be cited, leave little room for argument concerning the advisability of establishing the optimal intensity concept in regard to the electric shock. It is apparent, however, that large differences in optimal value exist within a single species, and that these differences must be equally as large if not larger between species.

### *Food*

#### AN INCENTIVE

The food stimulus has probably been employed more frequently than any other in investigating the behavior of animals. (115), (69) and (126). It has been used by Thorndike (176), Kinnaman (96), Allen (1), Porter (138), Rouse (148), Yoakum (233), Hunter (84),

Carr and Hicks (28), Sackett (149), Breed (21), Churchill (33), Dashiell (42), Blodgett (17), Sharp (155) and others as an incentive in studying the behavior of various species of animals. Chicks, monkeys, guinea pigs, sparrows, pigeons, squirrels, porcupines, goldfish, rats, mice, etc., have been used as subjects. In practically all of these investigations, however, problems of behavior lying outside the field of this paper were the primary concern.* So far as the problems of motivation are concerned, the investigations as a group do little more than to classify food as an incentive. For this reason we feel justified in mentioning the studies without discussing them.

### KIND AND AMOUNT OF FOOD

The effect of the kind and the amount of food given on its incentive value has received much less attention than the general problem of food as an incentive. It is, of course, generally recognized in psychological and biological work that both factors affect the incentive value of food, but so far as the writers are aware only three investigators have made inquiries that throw any light on the problems. Grindley (66) seems to be the only person who has studied the relation of amount to incentive value, and the investigations by Simmons (158), Westerfeld (215) and Elliott (53) are the only studies that have a bearing on the problem of kind of food and incentive value.

Grindley studied the influence of the amount of food given as a reward on the rate at which young chickens learned certain relatively simple performances. A small wooden tray was placed at the end of the passage remote from the release-box, and a certain quantity of food was placed on this tray; the amount of food being the same for each chick of a given group, but differing from group to group. This set-up was slightly changed for other experiments. The rewards given to the chicks of various groups were as follows: Group 1, one grain of boiled rice; Group 2, two grains; Group 4, four grains; Group 6, six grains; and Group 0, no reward. The results of the experiments support the view that the amount of reward has some influence on the rate of learning. Individual differences between chicks were so great, however, that it was impossible to establish

* The studies by Dashiell, Sharp and Blodgett are exceptions. They were primarily concerned with demonstrating that food is an incentive, and in all cases their results were positive. Dashiell's study showed food to increase the activity of rats. Sharp found a marked disintegration of the maze habit when the animals were not rewarded by food. Blodgett found rats to learn more rapidly when rewarded by food than when not rewarded.

the results accurately in quantitative fashion. The nearest approach to a quantitative expression is that a six-fold increase in reward produced an increase of about twenty-five per cent in rate of learning.

Simmons compared bread and milk with sunflower seed as incentives with white rats. The maze technique was employed. She draws the following conclusions from the study. (1) The two food incentives differed in their effects on the learning process. (2) As judged by the average records for the groups, bread and milk was more advantageous than sunflower seed for both mazes and for all three criteria of learning (trials, errors, time). (3) The superiority of bread and milk over sunflower seed appeared in the initial trial. (4) The form of the learning curve is approximately the same under the two conditions of incentive, though the curve of the sunflower seed group falls slightly faster at the beginning than does that for the bread and milk group. (5) The records of the sunflower seed group showed a greater variability than the records of the bread and milk group for all three criteria of learning. (6) The differences between the three groups are greater for time than for errors.

Westerfeld employed unpalatable food in training mudminnows to form certain associations. Camphor soaked paper, refused by the minnows, was associated with high tones while acceptable food was associated with low tones. The results of the investigation are cited in connection with this group for two reasons. They not only show that the incentive value of food is affected by its quality but also suggest that certain kinds of food may possess a negative incentive value.

The experiment by Elliott (**53**) has only a very indirect bearing on the relation of kind of food to its incentive value. In training rats to run a maze, the food was changed from bran mash to sunflower seed. The results show that the error and time scores increased at the point of change. It is rather difficult to interpret this effect; it may be due to change or to the kind of food.

The results of these experiments indicate quite clearly that there is a relation between kind of food and the incentive value of food. There is also an indication in Grindley's experiment that the amount of food affects its incentive value. Much more work needs to be done, however, in regard to this problem before one can make significant pronouncements.

STARVATION IN RELATION TO FOOD

The relative effects of different degrees of starvation on food as an incentive have been studied by Elliott (54, 55), Szymanski (174), Holden (76), Warner (204), Ligon (110), Tolman, Honzik and Robinson (177).

Quite recently Elliott has shown that food is an incentive only in case the animal (white rat) is hungry.

Szymanski, although chiefly concerned with other problems, studied the effects of three different degrees of hunger on the incentive value of food. Eight white mice were trained in a simple labyrinth. Under one condition the animals were fed one-half hour before being introduced into the maze; under a second condition they were fed from four to four and one-half hours before the day's trials; and, under a third condition they were fed from twenty-one to twenty-four hours before the trials. The results of the experiments show that the highest intensity of hunger (twenty-four hours) is more favorable to learning than the middle degree (four hours) and that the middle degree is more favorable than the least degree (one-half hour).

Similar results are reported by Ligon. In a study with white rats of the effects of food deprivation for 6, 12 and 21 hours, his results show the 21 hour group to be superior to the other groups.

The studies by Holden and Warner, in which the electrical obstruction method was employed, point in the same general direction as the foregoing. They show starvation to have an effect on the incentive value of food. Their experiments, however, included starvation periods of greater length than twenty-four hours, and for this reason they are able to point to an optimal range. Holden places this between 12 and 36 hours with the highest point of the curve nearer to 36 than to any other figure. Warner notes an increase in the strength of the hunger drive up to a period of four days, and a gradual decrease from this point on. He also observes that the tendency reaches its highest point in the female rat much earlier—possibly after one day of starvation. This may be taken to indicate that conditions uncontrolled in the experiment may have affected the results. After the second day the tendency is never as strong as it is in the male after a four day period of starvation.

Tolman, Honzik, and Robinson report a study which has a bearing on this problem. They compared the behavior of very hungry and less hungry rats with respect to long and short blinds. The more hungry rats eliminated the long blinds earlier, and the less hungry rats eliminated them later.

### TEMPORAL RELATIONS AND FOOD

A second problem issuing directly from investigations in which food was used as an incentive is the relation of the time interval between the successful completion of an act and the giving of food to the incentive value of the stimulus. This problem has been studied by Watson (**214**), Warden and Haas (**200**), Hamilton (**69**) and Simmons (**158**).

Watson studied, by means of the problem box technique, the effect of one period of delay (30 seconds) in feeding on the learning of the white rat. The results show that the period of delay had no effect on learning.

The work of Watson was extended in two directions by Warden and Haas. They employed the maze instead of the problem box, and used intervals of delay of one minute and five minutes. A total of 43 white rats of approximately 80-gram weight were used. The control group included 15 animals and the two test groups, 14 each. The diet consisted of whole wheat bread and milk and a sample of the regular diet was used as the incentive stimulus. Their results, if accepted at face value, would lead to the conclusion that although a 5-minute interval of delay is not disadvantageous, a shorter one such as one minute may be so. Warden and Haas are inclined to leave the matter open for further investigation.

The experiment reported by Hamilton is undoubtedly the most elaborate of this group. She studied by means of the obstruction method and learning method the effects of five intervals of delay in feeding. These were 15 seconds, 30 seconds, one minute, 3 minutes, 5 minutes, and 7 minutes. As measured by the obstruction method, the hunger drive was decreased by a period of delay of 15 seconds between crossing and obtaining food, the percentage of decrease in crossing being 43 in the 20 minute test period. Thirty seconds and one minute delays showed approximately the same decrease in the number of crossings, while delays of 3 minutes brought a 73 per cent decrease of crossings when compared with the control group. When two perfect trials out of three were the criterion of mastery of the maze in the learning experiments, delays of one minute increased the trials necessary for mastery 97 per cent, the errors by 85 per cent, and the time required for mastery 112 per cent. Delays of 3, 5, and 7 minutes did not further decrease the speed of learning as indicated by trials and errors, but did bring about a further increase in the time scores. All rats learned the problem by the 50th trial. When 4 perfect trials out of 5 were the criterion of mastery, 9 of the 105 animals failed to learn the maze.

The experiment by Simmons was made in connection with her study of the effectiveness of various incentives on animal learning. She made a brief test of the effect of delayed feeding on the learning of a complex maze. One group of rats was fed immediately after practice each day; the other group was fed one and one-half to two hours after the last run. The results of the experiments show the immediate feeding group to be slightly superior in respect to number of trials, but inferior in respect to time and errors.

It is rather difficult to draw a definite conclusion from the results of these experiments. Watson, Warden and Haas agree rather closely concerning the effects of short intervals of time. It appears from their results that short delays up to 5 minutes have no effect on the incentive value of food. On the other hand, Hamilton in a carefully planned series of experiments gives results that point in the opposite direction. Every interval of delay up to 7 minutes affected the incentive value of food. And the results of Simmons show that delay intervals of longer duration, up to two hours, affect the incentive value of food. It appears that the safest path to follow is to ask for further experiments on the same problem before generalizing. In the meantime it may be assumed for experimental purposes that intervals of delay in feeding may have an effect on the incentive value of food.

### THE INNER MECHANISM OF THE HUNGER DRIVE

In addition to these studies of food as an incentive, investigations of the inner mechanism of the drive that bear rather directly on the problem of motivation have been made by Cannon (26), Carlson (27), and Wada (195). They employed in each case a rubber balloon which was swallowed in a collapsed condition, inflated with air so as to contact the walls of the stomach and connected with a device recording graphically the contractions of the stomach during the conscious development of hunger. The records show that hunger contractions begin three or four hours after eating and continue for some time but cease after some days of absolute fasting. The contractions are accompanied by consciousness of hunger, secretion of saliva, movements of the body, dreaming, increase of the hand grip, and greater mental efficiency. Hunger movements cannot be voluntarily controlled but are inhibited by interesting emotions such as fear and rage.

### WATER (THIRST)

The effect of water deprivation upon the behavior of animals has not been subject to such extended investigation as has inanition

following food deprivation. The only study primarily concerned with the problem is reported by Warner (203) although data bearing on the problem are contained in two other studies (55, 142).

Warner studied the effects of four periods of water deprivation, 1, 2, 4, and 6 days, on the activity of white rats by means of the obstruction method. His results are summarized as follows: "The tendency of the white rat to approach water . . . is at its low point when the animal is tested immediately after being removed from a cage containing available water. Of the periods studied, that of one day of water deprivation results in the greatest demonstration of this tendency. From this point on the tendency diminishes constantly until the death of the animal. Sex differences appear to be negligible. This tendency seems to be as strong in the white rat as that to approach food.

The studies by Richter and Elliott are important contributions in this field but add very little to the results reported by Warner. Richter using the rotating wheel apparatus for measuring general activity, found that three animals, "starved but permitted to have water all the time showed a definite increase in activity for the first two or three days after the beginning of starvation and then a steady marked decrease to a point of almost complete inactivity on the eighth day." In contrast to this four animals "deprived of both food and water showed a steady marked decrease in activity immediately. This group reached a point of complete inactivity on the fifth day." Elliott, in a study of appropriateness of reward upon maze performance, demonstrated that the white rat must be thirsty before water possesses a "reward value."

### *Sex*

The problem of sex in its various phases has without doubt received more consideration than all of the other problems of motivation combined. We cannot even begin to summarize or mention the literature of scientific value bearing on the problem. The best we can hope to accomplish is to call attention to two or three of the problems investigated and suggest a few of the more important studies in the field. Any one who is interested in making a comprehensive survey of the field is referred to the bibliographies compiled by Lipschütz (111), Biedle (15), Marshall (114), Harms (71) and Nissen (127).

From the point of view of the present paper, the discussion of sex may be centered around three problems: (1) sex as a drive or incentive, (2) the conditions affecting the drive or the incentive

value of sex, and (3) the incentive value of sex as compared with other incentives, electric shock, food, etc. We shall discuss the first two of these in this section and reserve the third for a later section.

#### AN INCENTIVE

Two general classes or types of studies definitely classify sex as a drive or incentive. In a number of studies cited by Nissen (Nos. 53, 37, 16+117 of Nissen's bibliography), alteration of the sexual mechanism has been followed by changes in the behavior of animals. Castration, for example, is ordinarily followed by decreased activity unless performed very early in the life of the animal, while transplantations and other modifications similar in purpose may under certain conditions increase activity temporarily. In other studies the introduction of the sex object has been found to be a powerful stimulus (incentive). Jenkins (91) and Warner (202) found that rats would suffer considerable sensory pain, produced by the electric shock, in order to reach the sex object. The two groups of studies show rather clearly that sex is a drive and that a sex object may be an incentive.

#### CONDITIONS AFFECTING SEX

It is evident on the basis of the consideration of sex as a drive or incentive that its value may be affected by numerous conditions. In general, any variation in the anatomy and physiology of the sexual mechanism may affect the drive, or relations between two sexual conditions may affect the value of the sex incentive (127). This appears to be especially applicable in regard to the female. For example, Wang (196) has shown that there are rhythmical variations in the spontaneous activity of the female during the oestrous cycle. During dioestrum the animals are relatively quiet whereas at oestrum they show great activity. Furthermore it is generally recognized in experimental work with animals that the physiological state of the animal, in particular the female, has a very marked effect on the incentive value of the sex object. Females in oestrum are generally recognized as the most powerful sex objects (202, 127).

### *Miscellaneous*

#### "DISCOMFORT STIMULI"

A number of studies involve types of motivation rather difficult to characterize since we can scarcely speak of physical resistance, confinement, "manhandling," bumping, hot, cold, dryness, etc., as forms of punishment. We may perhaps group all of these as "general discomfort motives."

Among studies of this kind is that of Möbius (118) who observed the reactions of a pike separated by a transparent glass plate from an adjoining aquarium stocked with fish. The pike dashed himself with such violence against the glass in trying to catch the other fishes that he was sometimes completely stunned. This went on for three months until the pike finally ceased his efforts. The glass plate was then removed but the pike would not attack these particular fishes though he would devour others which were afterward introduced. A fixed association had arisen between attack and physical resistance in the case of a particular kind of fish. Nearly thirty years later Triplett (182) repeated the experiment using two perch—male and female—which had been fed for several months solely on minnows. At the beginning of the experiment a glass partition was placed in the aquarium and the food of the perch was changed to earthworms. Minnows were placed on one side of the divided tank for a period of thirty minutes three times a week during an entire month and afterwards daily. After the removal of the minnows the perch were fed with worms. The perch at first went after the minnows, bumping their heads on the glass partition. Efforts to catch the minnows gradually became more infrequent. Later on the minnow was admitted to the perch section of the aquarium. The latter were at first fed but in subsequent experiments unfed. The perch did not go beyond weak attempts at attack, never actually seizing the minnow. The experiment was now modified to conform to that of Möbius. Minnow and perch were left permanently together (1) separated by the partition, (2) with partition removed. The conduct of the perch was similar to that of the previous experiment. Triplett says the fish were acting under the suggestion of previous failures and notes that the effect of training could be overcome under certain circumstances, *e.g.*, the sudden swift movement of prey or excessive hunger.

That mere passive physical resistance unattended by physical shock such as the fishes encountered may become an incentive to a change in behavior is indicated by the experiments on the color sensitivity of birds. Hess (73) found that "a hen which had been taught to avoid red grains of rice, after feeding on a black cloth where green grains were fastened down and red grains loosely scattered, learned to avoid the green but accepted the red grains."

Several investigators have resorted to "manhandling" as means of motivating certain responses otherwise difficult to elicit. Fulton (60), citing an experiment of Turner's, tells of a species of silk worm moth, telea polyphemus, which scarcely responded to sound since there were but three positive responses in 78 trials.

Finally individual moths were tested one by one. After sounding an organ pipe five times the experimenter would take the moth and squeeze it, throw it down on its back and manhandle it in various ways without seriously hurting it. This was repeated a number of times, and resulted in the education of several specimens "so that they moved their wings vigorously whenever the pipe sounded and did so on the following day also." Bethe (14) relied on rough treatment on the part of a hostile animal in his attempt to train crabs to avoid light. The animals were placed in a basin which contained in its darkest corner an eledone (cephalopod). The crab at once sought the darkness and was seized by the cephalopod. When set free and placed at the other end of the basin it promptly returned. This was repeated five times with one crab and six times in the case of another without evidence of learning though Miss Washburn thinks the experiment was not continued for a sufficient length of time. In another experiment the crabs in an aquarium were baited with meat. The experimenter held his hand above the food and the hungry crab attempting to seize the food was maltreated in an effort to teach the crabs to associate meat with danger. Several fruitless repetitions of the experiment led Bethe to the view that crabs lack psychic qualities.

Yerkes and Huggins (230) in their study of habit formation in crawfish placed the animal in a dry jar for five minutes in order to increase the desire to return to the water. Under such conditions they observed ability to learn simple labyrinth habits. The crawfish learned rather slowly, from fifty to one hundred experiences being required to produce a perfect association.

Yerkes (226) in his work on the extent and rapidity of learning in common turtles used labyrinths of several degrees of complexity and a variety of motives to induce the animals to try to find the way to the nest. The motives included, first, the desire to hide in some dark secluded place; second, the impulse to escape from confinement, and third, the desire to get to a place of comfort. Under these conditions turtles profited rapidly by experience. The average time for the first ten trips was eight minutes fifty-four seconds. The average time for ten trips between the fortieth and fiftieth trials was one minute three seconds. There was little aimless wandering the animal seeming to exhibit goal behavior.

The effect of temperature as a motive has been brought out by Glaser (65) in his experiment on habit formation at high speed, cited by Watson (231). "Where rats were dropped into hot and cold water and allowed to find an entrance, it was shown that the

animal formed the habit of turning correctly in the hot or cold water, finally reaching the exit." Here as Kuo (101) observes "the sole drive in learning was the tendency to escape" compelling the animal to face an unpleasant situation which he would ordinarily avoid.

### COMBINED INCENTIVES

Several studies (75), (53, 54), and (120) have combined two or more of the foregoing incentives and have compared the effectiveness of the combined incentive with single incentives. Hoge and Stocking, for example, combined punishment and reward and found the combination to be more effective than either punishment or reward used alone. In general these studies have shown that a combined incentive, *i.e.*, mere number, is more effective than a single incentive. This field is very promising for further investigation.

### COMPARISON OF INCENTIVES

The determination of the comparative value of various incentives used in animal studies is a problem of great importance and difficulty. The few comparative studies which exist are summarized below, but it is at once clear that no systematic effort has been made to compare each incentive or motivating factor with every other one in common use. This would demand an extensive experimental program, and in theory should lead to the establishment of a hierarchy of incentives arranged according to the order of effectiveness. But this is a difficult undertaking, since incentives differ in character, some being relatively persistent, others periodic in their manifestation. The value of a given incentive will vary with the position of the animal in the scale of organisms, and the suitability of the problem so that a hierarchy of incentive values established for a given animal, would not necessarily apply to an animal higher or lower in the scale. In any incentive situation, there may be the complication arising from residual incentives of a different kind as well as that due to facilitating and inhibiting factors. Identical subsidiary factors might influence different main incentives, *e.g.*, sex and punishment, in opposite directions. Until such influences can be weighed accurately it would seem that determinations of the relative value of incentives can only be approximate.

### FOOD AND ELECTRIC SHOCK

The relative incentive value of food and the electrical shock has been the major problem of two investigations (75) and (50) and one of the problems of a third (120). Hoge and Stocking appear

to have been the first to attack this problem. They compared food and the electric shock as incentives in training rats to discriminate between two lights of different intensity. Their results show the electric shock to be more effective than food. The study reported by Dodson is somewhat more elaborate. He compared four degrees of hunger with four intensities of electrical shock by means of the obstruction method. Eighty white rats were used. For all degrees of intensity compared, the electric shock was more favorable to learning than was food. The rats, of course, reacted differently to the various intensities of the stimuli. In general the learning proceeded more rapidly as the intensity of the stimuli was increased up to a certain point, but beyond this point learning was inhibited. The most effective shock was "seventy-five units," and the most effective hunger period was between 41 and 48 hours. The study reported by Moss is very similar to Dodson's. Moss compared hunger drives produced by 12, 24, 48, and 72 hours of starvation with a 20 volt resistance. The results of the study show that in eight cases out of ten a hunger drive of 72 hours is stronger than a 20 volt resistance.

It is rather difficult to draw more than one significant general conclusion from the results of these experiments. The optimal intensity of electrical shock has a greater incentive value than has the optimal intensity of food or hunger. Stated in other terms the electric shock may be made sufficiently intense to inhibit activity directed toward the acquisition of food. One may of course apply this conclusion to food activity produced by any degree of hunger but when this is done the comparison is of little scientific value. Within certain limits one might interpret hunger activity in the same manner. Note, for example, the general conclusion formulated by Moss.

### SEX AND THE ELECTRIC SHOCK

Two studies that are representative of the investigations in which the incentive value of sex objects and the electric shock may be compared are reported by Moss (120) and Warner (202). These studies are not primarily concerned with the comparative study of sex and the electric shock, but they contain data that may be used to throw light on the problem. Moss attempted to measure the strength of the sex drive by the electric shock obstruction method. Ten white rats, five male and five female, were obstructed from reaching a sex object by a 28-volt shock. The results of the study that have a bearing on the present problem show that two of the

five males overcame the obstruction to reach the female, and three of the five females overcame the obstruction to reach the male. Aside from demonstrating the sex drive to be stronger in the female than in the male, the results show the sex drive to be about equal to a 28-volt resistance. We are doubtless justified in supposing that stronger intensities of shock would have inhibited the behavior of the rat. For a criticism of this study the reader is referred to Warner's study (202). The study reported by Warner (202) is very much more elaborate than the foregoing, yet the results from the standpoint of comparative study point in the same direction. It is significant to note that 251 rats, 160 males and 91 females, were used in the study. The potential incentive value of the electric shock is greater than is the potential incentive value of any sex object. This principle holds true for optimal values.

### FOOD AND SEX

Studies of the relative incentive value of food and sex objects have been reported by Tsai (184) and Warner (204). Tsai studied the behavior of adult male rats toward the two incentives, food and sex objects, by means of the maze technique. The results of the study show "the normal hunger motive in the albino rat to be stronger than that of sex." Warner investigated the strength of the two drives by the obstruction method. He summarizes the study as follows: "Comparison of the groups which, of those tested, represent the hunger and the sex drives at their maximum, indicates that the tendency for the white rat to approach a food object is stronger than its tendency to approach a sex object. This is true of rats of both sexes although the difference is not so great in the female" (p. 298).

### OTHER COMPARATIVE STUDIES

In addition to these comparative studies of the more common incentives, Lashley (108), Kuo (101), Moss (120), Szymanski (172, 173), and Simmons (158) have contributed reports that properly belong in this field. They have, for example, compared the electric shock with confinement; heat with moisture; "mother love" with home cage; sex with cold and with hunger, etc.

Lashley was primarily concerned with the effects of distribution of practice on the acquisition of maze habits by white rats. Accordingly the experiments were arranged to provide for different distributions of practice. Under one condition food was placed at the end of a blind alley. For a second condition the rats were allowed to explore the entire maze without food for twenty minutes.

This group tests the influence of an initial trial without incentive. A third condition provided food as in the first, at the end of the blind alley, but did not allow the rats to correct errors. For the fourth condition a dish of food, placed behind a screen was put at the end of the cul-de-sac. The results of the experiments show that the second condition was most favorable to learning, and the fourth condition least favorable.

Kuo's experiments were designed to analyze the mechanism by means of which unsuccessful movements are eliminated, but it gives some data which may be interpreted from the comparative standpoint. A multiple choice apparatus containing four compartments was used. One of these compartments led the animals to the food-box by a short path; another, by a longer path; a third, confined the animal for a period of time; and a fourth, provided an electric shock punishment. Thirteen black and white rats were used. When the animal was admitted by the entrance door, he had to choose one of the four compartments in order to get food, and after the rat had learned to go to the correct compartment consecutively for fifteen trials without an error, the habit was considered as perfected. The results of these experiments may be summarized as follows: (1) The electric shock compartment was eliminated sooner than the long path compartment. (2) On the whole, the confinement compartment was eliminated sooner than the long path compartment. (3) All but two of the 13 rats finally chose the short path.

The studies reported by Szymanski, although apparently concerned primarily with discovering stimuli of a motivating character, contain results that may be compared. In one investigation three series of experiments were conducted. In the first series of experiments five adult mice were to learn to escape from a labyrinth whose floor was heated to a temperature between 41° and 43° C. This series of experiments was repeated with three young mice to form the second series of experiments. For a third series of experiments five adult mice were to learn to escape from a maze with a floor covered with cool water. The results of these experiments were as follows: (1) The adult mice learned the maze with heated floor on an average of 3 trials. (2) Four adult mice learned to run the maze with moist floor on an average of 7.5 trials, while one mouse did not learn after 31 trials. (3) The young mice learned to run the maze with the heated floor after 7.7 trials. It is apparent from these results as Szymanski points out that the heat stimulus was more conducive to learning than the moisture stimulus. It is possible, however, that moisture may be more or less of a negative incentive

and that a different technique would yield entirely different results.

The second investigation, reported by Szymanski, was directed toward discovering the effects of "no vital impulse" (*i.e.*, no incentive), home cage, and "mother love" on the maze learning of rats. The results of this study are not especially significant for our purpose. They suggest the order of effectiveness of the three stimuli to be as follows: Mother love comes first, home cage second, and no vital impulse last.

There remain for review the investigations by Moss and Simmons. Along with other experiments, some of which have already been mentioned, Moss compared the hunger drive, the sex drive, and the resistance-to-cold drive from the point of view of their effectiveness in controlling the behavior of white rats. The obstruction method was employed. The results of this study rank the drives in the following order. The most effective is hunger, the next sex, and final in effectiveness is cold water. Another experiment in the same series classes the maternal drive as weaker than a 72 hour hunger drive and the sex drive.

Simmons compared bread and milk with (1) escape from the maze, (2) return home, and (3) sex. She concludes that bread and milk singly or in combination with other incentives were much more effective than the other incentives, especially escape or return home.

In concluding the survey of motivation in animal psychology, the reader may be referred to the reviews of Shepard (**156, 157**), Vincent (**192, 193, 194**), Washburn (**205, 208**), and Watson (**210, 211, 212**) for brief summaries of many of the studies discussed.

### MOTIVATION IN HUMAN PSYCHOLOGY

Experimental studies of motivation in human psychology were a logical development from investigations of animal motivation, and for the most part deal with similar problems by similar methods. Thus most of the experiments treat of the influence of traditional animal incentives on habit formation and discriminative processes. A few, however, deal with the qualitative or quantitative aspects of performance involving the efficient use of systems of habits already formed. This seems to have no parallel in animal psychology where the influence of motives on training has been determined, but no study of their effects on completed habit systems resulting from rigorous training has been attempted. To do so one would have to experiment with highly trained animals such as the Elberfeld horses or various circus animals. Moreover, studies of animal motivation

are confined to overt or explicit reactions, while those of human motivation in theory at least, may deal with reactions of any kind, including the so-called implicit, such as concept formation, interpretation, etc. Even if these are regarded simply as verbal reactions the field of study becomes infinitely more complicated than in the case of the animal. In man reactions of any kind may be studied not only in their overt expression where this is possible, but in their inner or symbolic aspects as reflected in verbal behavior. An example is Allport's attempt to study the influence of the group on thought processes, including such reactions as the interpretation of selected passages of philosophy.

In the second place, the range of motives available in motivation experiments with human beings is more limited in some respects, less limited in others, than is the case with animals. It is more limited in the sense that some of the motives appropriate for use in animal study are too simple for human beings, difficult in practical application, or even unavailable. This is true of several of the most fundamental motives of organisms considered simply as animals. Thus, while punishment may be used with both animals and humans, food is impracticable except with young children, while direct use of the sex stimulus is practically excluded. On the other hand the range of human motives is less restricted, in that the human being responds to a new set of motives, some individual, others social. Motives of the first class include attitude, knowledge of results and suggestion. Social motives are those embodying the effect of a group. Such are the effects of an audience, competition, rivalry and praise or blame. Moreover, certain motives which probably remain simple in animal experimentation fall into several nuances and suffer conscious mnemic complication, when applied to human beings. Thus the pain of the punishment motive is probably a relatively simple immediate experience to the animal while in man it becomes a mode of the disagreeable, further complicated by conscious anticipation and recollection, or if the description is preferable a matter of immediate experience plus parallel implicit verbal reaction with its habitual affective tone. Other motives doubtless undergo a similar internal differentiation, or as a new school might say, presents a more or less pregnant Gestalt on the total psychic background. A good idea of the complexity of motives may be obtained from the textbook discussions of Carr (**30**), Hollingworth (**78**), Smith and Guthrie (**161**), Perrin and Klein (**133**), and Thomson (**175**), and from the theoretical

treatments of English (**56**), McDougall (**113**), Perrin (**132**), and Snow (**162**).

### CLASSIFICATION OF EXPERIMENTS

In view of the preceding statements we might expect numerous and varied experiments in the psychology of human motivation, but this is not the case since the latter is largely a product of the objective general psychology which has been quite recently built up on the foundations of researches in animal behavior dating much further back. The field, therefore, is an almost virgin one, and some of the earlier experiments which we shall cite were not conducted with any specific consciousness that motives were being revealed. The experimenters were merely interested in new aspects of well known processes. A careful survey of past experimental literature would disclose many unconscious contributions to a psychology of motivation, works which at the time of their publication were prized for their bearing on quite other problems. On the other hand, during the last fifteen years, students have deliberately investigated the range and comparative efficacy of motives with human subjects. The problems investigated include: (1) the influence of pain (usually an electric shock) or modalities of the disagreeable on various aspects of muscular response and discriminative activities. (2) The influence of what may in general terms be referred to as the attitude of the subject on learning and quantitative achievement. (3) The influence of knowledge of results on learning and efficiency, endurance and fatigue. (4) The influence of social motives including (a) effect of groups in general, (b) the influence of special groups such as audiences, (c) competition and rivalry, (d) praise and blame, (e) ridicule or "razzing," or (f) a combination of such motivating factors.

Investigations may also be divided into: (1) Those dealing with the influence of one or a combination of motives on various aspects of discrimination and achievement. (2) Comparative studies of the relative efficacy of motives or various intensities of the same motive. This class includes comparisons of the relative efficacy of motivation, and improving factors of a different order, such as practice, and possibly preservation or inertia of reaction, and spontaneous maturation. (3) Investigations of motives, determining conditions in a general field, institution, system of conventions, etc. Examples are: Studies of motives in religion, fashion, etc. This type of study is

in embryo and extant examples are generally based on questionnaires or deductions from experimental studies of simple processes.

## METHODS

The methods employed in the various experiments were on the whole perfectly objective, *i.e.*, the conclusions are based on a comparison of the objective, recorded activities of subjects, whose introspections merely served as guiding factors in experiments but not as elements of comparison. A few investigators including Laird (**103**) and Hurlock (**89**) rely partly on introspective and retrospective data of their subjects in studying social motivation but these are exceptions. Thus Laird (**103, 104**) in studying the sources of motivation in high school and college students uses the retrospective accounts of his subjects as a basis for classification, while Hurlock (**89**) employed questionnaires in her study of the motivating factors in fashion. These methods are almost inevitable in dealing with such complex topics. The objective methods followed in the great majority of the experiments fall under the general heads of:

1. The simple reaction method, illustrated by Johansen's study of the effect of positive and negative incentives on reaction time.

2. The learning method, an example of which is Bunch's (**23**) investigation of the effect of a definite intensity of electric shock on the learning of a maze or Wohlgemuth's (**221**) study of the effect of active and passive attitude on the learning of visual material.

3. The discrimination method, illustrated by the experiments of Rexroad and Judd on the effects of incentives on accuracy.

4. The maximum or optimum achievement method or qualitative and quantitative study and measurement of standard performances under the influence of incentives. This is illustrated by Crawley (**39**) in his study of the effect of incentive on amount of work and fatigue, or by Chapman and Feder (**32**) in their investigation of the influence of knowledge of results, publicity and mild reward on school work.

5. The group response method illustrated by most studies in social motivation.

## PUNISHMENT

This brings us to a summary of results in which we shall follow the order suggested in the classification of problems.

As preparatory to the use of actual punishment as a motivating factor we may include early studies of the effect of disagreeable stimuli on simple motor functions. Thus Cleghorn (**34**) using an ergograph found that voluntary muscular contraction was increased

by violent stimuli such as light, sound or electric shock, and Rose (**146**) measured the latency of reaction and force of contraction under the influence of unpleasant gustatory stimuli finding an increase of 65 per cent in the force and of 73 per cent in the acceleration of reaction. Others noted similar phenomena in animals thus ascertaining the presence of sensory activity not revealed by normal behavior. Johansen (**94**), Rexroad (**140**), Bunch (**23**), and Vaughn (**190, 191**) employed electric shocks as the punishment motive in experiments on reaction time, accuracy, learning and inhibition of response. Johansen (**94**), comparing the effects of knowledge of previous reaction time, and electric shock upon reaction time, found that both produced acceleration which was greater, however, with the negative incentive of an electric shock. Rexroad (**140**) investigated the effect of electric shock on accuracy of reaction to a set of colors presented in chance order. According to Rexroad punishment has three effects—disruptive, incentive and instructive. The instructive varies inversely to comprehension of the task and therefore vanishes after some practice. The incentive effect appears in the rapid adoption of a plan for learning a code and in greater care to avoid errors. The destructive effect is in inverse proportion to the stability of the habit and offsets the incentive effect during the learning of a code, but is afterwards offset by the incentive effect.

Bunch (**23**) investigated the effect of a definite intensity of electric shock (*27* volts A.C.) on adult human learning of a maze. Eighty subjects including equal numbers of men and women participated as subjects. Bunch found (1) a decided decrease in the number of trials required to learn the maze amounting to 50 per cent regardless of criterion, also a decrease in the variability of trials. (2) A decrease of approximately 30 per cent in the total time required to learn the maze and decrease in variability. (3) An increase of approximately 34 per cent in the time per trial, and also an increase in variability of time required per trial. (4) A decrease of approximately 30 per cent in the total number of errors made during the mastery of the problem, and a decrease in variability. (5) A decrease in all types of errors (a) retracings over a whole or part of a true pathway, (b) entering a cul-de-sac after having started toward the entrance, and (c) coming in contact with the end of a blind alley. There is an increase in efficiency regardless of criterion except in the amount of time required per trial.

Vaughn's (**190**) experiments described in the section on comparative studies show the superiority of punishment over other motives in producing inhibitory behavior. Hamilton (**70**) studying

accuracy of discrimination finds little difference in the effectiveness of punishment and reward attitudes. Vaughn and Diserens (191) investigated the comparative effects of three intensities of electrical punishment on learning and efficiency. Thirty-two subjects worked at a stylus maze in which shocks were automatically administered for errors. Efficiency was measured by reaction times; learning by (1) the number of entrances of blind alleys and (2) time required to run maze. The experiments show that (a) reaction time decreases as the intensity of punishment increases, (b) learning increases, and (c) suggest the explanation that specific effects of punishment depend upon the subject's insight into the task and his span of attention. "If the task is extremely simple and the methods of meeting it come within the individual's span of attention, punishment will increase the efficiency of his performance. If, on the other hand, the task is complex and the methods of meeting its various phases do not all come within the span of attention, certain of the methods will be selected and others will be neglected. The methods selected will depend upon the relative strength of the motivating conditions, and the elements of the task to which in the individual's experience the stronger motivating condition is attached."

### REWARDS

The effect of rewards as motivating factors in human behavior is universally recognized but little systematic experimentation is to be found in this field. A few studies cited later utilize nominal rewards in the form of publicity or mild satisfaction of a social nature. The entire hedonistic theory of motivation lacks experimental evidence from this side. For example, food is a common animal incentive which has been neglected in human study though Arnold (6) in an unpublished University of Cincinnati thesis tried to determine the influence of the form and texture of menus on the rate of eating. She presents a historical survey of factors influencing appetite and reaction time in food situations. A general conclusion from her experiments seems to be "that the form, texture and appearance of menus modify the group reaction time in eating situations." Her paper might be called a study in the motivation of appetite. Further researches might be consistently based on the conditioned reflex experiments of Pavlow (130) where perception of food is certainly the motivating factor in the conditioning process. From this standpoint any perception which results in conditioning becomes a motivating factor in a very real sense. In this sense sex stimuli even of a general nature are motivating factors and although no direct use of

the sex motive has been made in human experiments it is plain that much of the vast literature on sex reactions cited by Nissen (127) is relevant to a thoroughgoing Psychology of Motivation. Thus such studies lead us from a study of motives as usually defined to the wider realm of forces conditioning behavior in a given situation.

### FACILITATING AND INHIBITING FACTORS

In such a broad view we might regard facilitating and inhibiting factors in general, as secondary or contributing or incidental motives as contrasted with the primary or sustaining or essential motives and incentives with which our paper is chiefly concerned. Thus, music and rhythm are facilitating factors in several kinds of activity. According to Diserens (47) music tends to delay fatigue, speed up voluntary activities, increase the extent of many muscular reflexes, reduce and alter normal suggestibility and electrical conductivity of tissues. In doing this music must set free a certain amount of energy which augments the primary drive involved in concomitant activities. This materially alters the immediate capacities of the organism and in such a rôle constitutes a motivating factor, practically employed in many South American business establishments. Temperature, humidity and pressure may likewise be regarded as motivating factors since Dexter (46) and Huntington (85) have shown that for each of these factors there are optimal conditions accompanied by work of maximum efficiency. Again, drugs and stimulants may be treated as positive and negative incentives to activity. The work of Rivers (143), Dodge and Benedict (48), Pearl (131) and Starling (165) on alcohol; Hollingworth (79) an caffein and Hull (83) on tobacco is especially significant in this connection. Small doses of caffein seem to improve certain mental and motor processes, while opinion is divided as to the effects of alcohol and tobacco. A critical treatment of the facilitating and inhibiting influences is to be found in the work of Bills (16) and Robinson (145) in which the student of motivation will find much valuable material upon which deductions may be based.

### ATTITUDE

The dominating factor of many experiments may be referred to in general terms as the attitude of the subject. An early experiment of this type was that of Wright (224) who compared amounts of work accomplished under two different mental attitudes. Under the first condition, the subject was told to work as hard and as long as he could, without idea of specified result. Incentive was absent. Under

the second condition, he was told to work at a prescribed task as long as strength endured, was permitted to observe results, and further stimulated by being asked to count strokes. The constant incentive was the attempt to reach, at every stroke a fixed point on the ergograph. The subject accomplished more work under the mental stimulus of a set task than he did when working without definite aim. Recognition of impossibility tends to decrease efficiency. Fatigue was reduced when the subject worked with a definite aim, despite the fact that the actual amount of work increased.

Woodworth (223) notes that the experiments of Ach and his pupils involving the formation of associations between paired nonsense syllables, followed by presentation of the first members of a pair with instructions to respond with syllables of prescribed type, resulted in a tendency to give previously associated syllables, consequently errors. "After a few experiments with this procedure, and especially after a false reaction, the subject is led to a vigorous resolve to do what he intends and not to be led astray." The genesis of such an attitude seems to mark the appearance of a spontaneous motive or incentive. The influence of an active attitude is illustrated by the work of Wohlgemuth (221) who repeated experiments of Meumann (52) and Poppelreuter (137). Both Poppelreuter and his subjects observed certain materials the former without the intention of learning, the latter with such intention. The active subject learned the material completely in twelve trials, while Poppelreuter maintaining a passive attitude learned little in 50 trials. Meumann worked with paired letters ab–cd–ef, etc. The first group of subjects were tested for memory of pairs in similar order. The subject was asked what follows b (c), d (e), etc., *i.e.*, in the first case subjects were asked to reproduce what they intended to learn; in the second case what they did not intend to learn. Subjects failed in the latter test. The intention to learn facilitated the learning process. Wohlgemuth himself worked with active and passive attitudes in two learning situations. The materials to be learned were black and colored shapes which were presented on a different background of gray or color. Presentation was (1) simultaneous and (2) successive. The percentage of correct associations under the two situations for both types of presentation were as follows:

| | Simultaneous Presentation | Successive Presentation |
|---|---|---|
| Spectacular (passive) attitude ..... | 40.6% | 11.7% |
| Learning attitude ..... | 60.2% | 38.7% |

Scores are decidedly larger for the active attitude.

Arps (7) studied one subject to see whether pupils in early spelling should form a general attitude toward a group of assigned words, or whether a specific attitude toward each word should be developed. Arps finds a group attitude toward a given list of words more efficient in immediate recall and less efficient in delayed recall. An individual's attitude toward each member of a group independent of special and temporal relations is more efficient in delayed recall and less in immediate reproduction.

Bronner (22) finds the results of mental tests greatly influenced by mental attitudes. Attitudes encountered in clinical cases include deliberate deception, recalcitrancy, sportiveness, general nervous excitement, lack of confidence, various emotional disturbances, or a complex of such factors.

Myers (122) contributes several studies on attitude and learning. A group of 26 girls was divided into equal sections and told to learn four five-word lists, each under a given number. Subjects were told that reproduction need not be in exact order, but words must be given under their respective numbers, to use all the time needed to learn correctly, and to learn as quickly as possible. The average time of 13 girls was 14 minutes and 47 seconds. The minimum was 8 minutes and 47 seconds. The maximum time 22 minutes and 40 seconds. There were 9 perfect records. The same test was given another group of 24 girls who were told they would have just 9 minutes. Ten made perfect records in 5 minutes less time than the average of perfect records in the first test. Awareness of a time limit for a task improves output, increases speed, but scarcely affects accuracy. In the second experiment, six subjects reconstructed literary selections from memory. Myers (123) found that "the feeling and general attitude of the subjects toward the tasks factored highly in the recall performance." Thirdly, Myers (124) tested individually 50 girls who studied groups of words so as to reproduce in exact order, with no time limit, for either learning or recall. Correlation between learning and recall time was negative, that is learning time and recall time varied inversely.

Fukaya (59) compared the relative effectiveness of voluntary extra effort and natural effort in copying, addition, and memorizing. "In copying effort increased speed with certain individuals and the maximum of effort was secured in the initial stages of each day's work; effort did not decrease errors or aid in their detection, except perhaps in initial stages. In addition, effort failed to increase speed with the possible exception of one subject. Effort increased accuracy

when the day's work was short. In memory effort was without effect for adult subjects and possibly detrimental for some of the children." Voluntary attention seems more effective in more complex types of work, practical activities, or when sustained by additional motives as these two studies indicate. Kitson (97) studied the daily output of 40 compositors for twelve months, finding that a bonus system increased the efficiency on the average from 58 per cent to 97 per cent during 20 weeks. The more experienced half of the men gained 50 per cent, the less experienced 75 per cent. Twenty-one exceeded the bonus point within four weeks. In the experiments of Book and Norvell (18) 48 men and 76 women were given four simple learning tests, the first involving 75 practice periods, the other three 45 practices each. The tests were (1) speed and accuracy, (2) locating and crossing letters, (3) habit formation, and (4) mental multiplication. In all experiments, subjects were divided into two groups, one ignorant of results, the other informed and kept interested. During the final third of the experiment the rôles of the groups were reversed. It was found that stimulus sections always outstripped the control group. Groups gained only when interested. A subject not subjected to this group of incentives during the first two-thirds of practice suddenly improved with interest incentives during the last third of practice. Incentives influenced men more than women, the intelligent more than the average.

The most recent studies of the influence of attitude are those of Sanderson (151) and Freeman (57). Sanderson proposed to study the effect on motor learning, of a specific mental set or intention instilled in the learner by specific instructions without his awareness of future applications. The activities selected were learning to trace a stylus maze and a number sheet of identical pattern. The intention was the "mental set in which the subject devoted himself to the learning of the pattern." It was found that pattern intention retarded the speed of learning a maze and a number sheet. An individual transferred from the sheet to the maze after learning the former learned the maze more rapidly. Transfer to the number sheet from the maze resulted in improved scores for both the "speed" (control) and pattern groups of subjects. The author concludes that the essential factor in learning is the intention of learning. Freeman (57) studied the formation of associations between musical chords and reaction keys under several conditions and concludes that an attitude of insight is more important than repetition, in learning complex material.

### SUGGESTION

Under certain conditions suggestion becomes a motivating factor, or modifies other incentives such as punishment. Brand (**20**), Bell (**11**), Strong (**168**), Poffenberger (**136**), and Langfeld (**105, 106, 107**) have all contributed data on this problem. Thus Poffenberger used an electric shock as stimulus in a reaction experiment gradually reducing the shock to a minimal point and found that the subject still reacted to the suggestion of the moving key. Brand found that the visual estimation of length was affected by suggesting error and Bell showed that "in general suggestion affects reproduction of triangles, auditory suggestions being more effective than visual, with individual differences of response." Strong noted the effect of auditory, visual and autosuggestion, each both positive and negative on dynamometer records finding that autosuggestion is most effective in heightening maxima. There is no choice between visual and auditory suggestion.

Langfeld (**107**), using a modified Whipple tracing board, studied voluntary movement under positive and negative instruction. The subjects developed both positive and negative attitudes which influenced performance. Instruction of either kind tends to break up accustomed attitudes and is useful only where it supplements the natural attitude. As early as 1896 Small, after exhibiting a number of sensory illusions in classrooms, decided that suggestibility in normal children is universal, intense and controllable by the teachers as a motivating factor in securing efficient school work.

### KNOWLEDGE OF RESULTS

Another motivating factor studied in considerable detail is knowledge of results which has been investigated by Judd (**95**), Spencer (**163**), Arps (**8**), Chapman and Feder (**32**), Starch (**164**), Crawley (**39**), and Ross (**147**). The earliest study seems to be that of Judd who had his subjects establish a relationship between a series of lines, successively withdrawn from the view of the draftsman. He found that practice without knowledge scarcely changes accuracy because there is no motive for improvement. When the subject can follow results corrected habits appear.

Spencer repeated Judd's experiments to determine whether a subject ignorant of results improved at all and found improvement in some cases.

Arps sought a quantitative statement of the influence of awareness as a factor in work, conducting experiments on the Bergstrom

ergograph with variation of load and rest pause. Subjects worked (1) in ignorance of the amount and character of work; (2) with complete knowledge of work. They showed greater efficiency under the second condition. Knowledge increases speed and efficiency in proportion to its completeness.

Chapman and Feder traced the effect of four types of incentive on simple addition, cancellation and substitution. The incentives were (1) publication of previous day's work, (2) indication of progress on day's work sheets, (3) presentation of learning curves, and (4) assignment of stars as credit to the upper 50 per cent. There were incentive and non-incentive groups. "The general trend of results shows that the incentive exerted a considerable effect on the amount of the product except in addition."

Starch reports an experiment by L. J. Coubal in which standard tests, in reading, writing, spelling, and arithmetic, were given monthly to elementary pupils who were kept informed of their records and strove to surpass them. "The pupils made on the average a gain in some studies twice as great as that made ordinarily in the course of a school year."

Crawley studied fatigue of arm and leg muscles using a form of chest weight apparatus. Subjects lifted weights vertically on guiding rods. The experiment was varied so that performance under no incentive versus incentive conditions might be compared. "More work was accomplished when the subject competed with the former record and with the results visible, than when the same task was performed without competition and with the results screened." This is even true of the combined records, agreeing with Arps' and Johansen's results.

Ross investigated the effect of knowledge of results on motor learning. Fifty-nine students worked at making groups of four vertical lines and crossing them with a fifth. Three equivalent sections worked during 12 periods, one informed as to daily progress, the others partially and uninformed. For the eleventh and twelfth periods the order of information was reversed. From the first to the tenth period the informed section gained from 2.2 per cent to 8.5 per cent more than the partially informed, and from 4.5 per cent to 12.6 per cent more than the section without information. Motivation exerted greatest influence on the intelligent.

Deputy (45) even finds that the mere knowledge of success in studies may be a motivating factor to college students.

SOCIAL MOTIVES

A second general division deals with social motives, including (a) effect of groups in general, (b) influence of audiences, (c) competition and rivalry, (d) praise and blame, and (e) razzing. An early study is that of Schmidt (153) who compared quality of achievement in solitary home work and social class room work in writing, composition, and arithmetic. The latter proved superior. One group made 270 errors at home against 184 at school. Omissions characterized home work, superfluities appeared in school exercises. The influence of a social situation on memory is indicated by Meumann (117) who read aloud lists of from four to twelve syllable words, the auditors at once recording all words remembered. The influence of the social situation varied inversely with the age of the subjects. Children eight and nine years of age remembered more when tested in the group. Subjects thirteen and fourteen years old were scarcely affected.

Allport (2), investigating the influence of the group on association and thought, carried out experiments in social stimulation and response in which all incentives to rivalry not inherent in the situation were eliminated. The first four experiments dealt with "free chain association." The fifth experiment was with controlled association and the sixth with thought processes, *e.g.*, the task of furnishing arguments against selected passages of philosophical writings. Allport concludes that (1) the presence of a co-working group favors speed in free association, 65 per cent to 93 per cent of the subjects responding in this way; (2) the group influence varies with the task, being most effective in mechanical activities; (3) individual differences in susceptibility to group influence exist; (4) group influence is most beneficial in early stages of work; (5) the slow are more favorably affected than the rapid; (6) variability of output varies with the character of the social influence; (7) the output of association in a group where all are forming associations in the same category is greater than that in groups where members work in different categories. More personal associations are produced in isolation. Members of a group produce (a) fewer personal associations, (b) more ideas suggested by immediate surroundings, and (c) a greater number of "free rising" ideas. Factors in social influence are (1) facilitating factors, (a) motor facilitation through group behavior, (b) rivalry intrinsic to the group; (2) impeding factors such as distraction, overrivalry and emotion. The former are more important. The group influence produces more ideas and prolix

expression; individual work, superior ideas and local precision. Originality appears to be a product of seclusion. In his work on Social Psychology, Allport (3) abstracts contemporary studies of social influences and explains further his own results with remarks on rivalry which he says increases quantity and speed rather than quality and precision of work.

Travis (180) studied the influence of the group on the speed of stutterers in free association, and found that 80 per cent produced more associations alone than when in the group. The average number of associations produced by all the stutterers alone is greater than their average together (68.1 to 65.3) and the mean variation is greater in solitary work. This reverses Allport's main conclusion, viz., "The presence of a co-working group is distinctly favorable to the speed of the process of free association."

The influence of competition and rivalry on individual or group performance has been studied by Triplett (181), Mayer (116), Moede (119), Whittemore (217), and Hurlock (88). Triplett's subjects competed in turning fishing reels at maximum speed and he concluded that "the bodily presence of another contestant participating simultaneously in the race seems to liberate latent energy not ordinarily available. The sight of the movements of the pace makers or leading competitors, and the idea of higher speed . . . are probably in themselves dynamogenic factors."

Mayer compared the influence of work in isolation and in group situations in which spontaneous rivalry developed. School boys averaging fourteen years of age were tested in written and mental arithmetic, writing from dictation, learning nonsense material, and completion of sentences. The subjects were tested individually and in a group with three types of instruction stressing (1) speed and quality, (2) quality, and (3) speed. Under the first condition competition improved scores made in isolation by from 30 per cent to 50 per cent. Errors decreased and individual uniformity increased in group performance.

Moede, studying strength of grip and rate of tapping with boys of similar age found that the more rapid tappers suffered reduction of speed when in competition with others, while in the gripping test the rivalry attitude is displaced by the will to conquer of the superior opponent.

Whittemore compared the effects of individual and group rivalry on adult performance, in hand printing. In one experiment each individual was told to "try to beat your fellow workers." In the other the group was told to "try to get as much done as possible,"

so as to beat the competing groups. A third group was told simply to try to get as much done as possible. Whittemore concludes that (1) all subjects turn out more work in a competitive situation, (2) the homogeneity of the group with respect to speed of performance is the same for competition and non-competition, (3) the slowest subjects profit most from competition. In a subsequent study Whittemore (**218**) finds that competition begins with a period of adjustment during which it increases, and that there is less competition with the group as a whole than with particular individuals, or with one's self. Competitive consciousness is characterized by increase of irrelevant ideas and marked physiological changes. Half of the subjects prefer non-competitive work. This suggests that the worry and strain of competition may sometimes reduce efficiency.

Hurlock studied group rivalry as an incentive to increased efficiency in school work and in its relation to age, sex and individual differences. The subjects were 155 children of both sexes ranging from nine to twelve years of age. The work consisted of modified Courtis arithmetic tests. Equivalent rivalry groups were stimulated by discussion and publicity and their achievements compared with a numerically equal control group. The rivalry groups outstripped the control group; girls, younger children, and those of inferior ability responded most to the rivalry motive. The use of rivalry increased accuracy. In short "rivalry is an effective incentive with school children."

Among social motives, none is more effective or controllable than praise and blame, encouragement and discouragement. Experiments by Gilchrist (**64**), Hurlock (**86**), and Gates (**62**) deal with this topic. Gilchrist gave the Courtis English test to a college class of fifty, after which he divided the class into equal groups and repeated the test, reproving one and praising the other group for performance in Test I. The group that was praised improved 79 per cent while the reproved group deteriorated in the second test. In this second group, good students of the first test deteriorated while poor students improved.

Gates and Russland (**62**) tested 74 college students in motor coördination and color naming under the contrasting conditions of praise and blame and no comment for showing in initial tests. The direction of improvement differed in the tests. In coördination, the order of decreasing improvement is (1) encouraged, (2) discouraged, (3) repetition. In color naming (1) discouraged, (2) encouraged, (3) repetition.

Hurlock (**86**) studied (1) the relative effects of praise and reproof used continuously over a given period, and (2) the effects

of praise and reproof given to one group on the behavior of a group which merely hears the statements (the ignored). There were four groups of 28 children, designated as (1) control, (2) praised, (3) reproved, and (4) ignored. The test activity was addition. The results indicate that regardless of age, sex, or initial ability, praise is the most effective of the incentives investigated. Reproof soon declines in effectiveness, while indifference is worst of all.

### THE EFFECT OF AN AUDIENCE

A transition to experimental studies of the effect of audiences on performance, appears in Laird's (**102**) study of changes in motor control and individual variations under the influence of razzing. Motor tests comprising tapping, the three hole test and steadiness in sitting and standing were given college men under conditions of (a) friendly competition and respectful silence, (b) noise, personal razzing and discouraging remarks. In all subjects steadiness of all kinds diminishes as does coördination to a less degree. Rate and fatigue of tapping suffer least and great individual differences appear. The fatigue index of tapping under normal conditions seems to be the best indicator of the performance of the individual under razzing.

Gates and Travis noted that introspective reports of both trained and untrained observers indicate that the presence of an audience considerably affects various kinds of performance. Gates (**63**) attempted to measure such effects quantitatively. The study included (1) the effect of spectators on a homogeneous group, (2) the effect of particular kinds of audience, (3) the reaction caused by the mere presence of spectators, and (4) the effect of an audience on the motor and association processes of individuals. The subjects were tested in coördination, color naming, and word analogies. Gates found that the mere presence or absence of spectators had little effect, statistical analysis of individual variations suggest that audiences may reduce efficiency particularly in the case of superior individuals. Allport (**4**) subjecting Gates' data to further analysis confirms this impression.

Travis (**179**) investigated the effect of a small passive audience on an eye-hand coördination test, viz,, holding a flexible counter on a revolving target. Learning curves were plotted for work in isolation and in social setting. A comparison of the ten highest consecutive scores under each condition show that 81.5 per cent of the subjects did better and 72.7 per cent achieved their best in the presence of an audience while only 13.6 per cent deteriorated. Travis concludes that eye-hand coördination improves in a social situation.

COMPARATIVE STUDIES

Comparative studies of human motivation, partly corresponding to studies in the animal field previously cited, have been made by Knight and Remers (**98**), Hurlock (**87**), Simms (**159**), Allport (**2**), Vaughn (**190**), Hamilton (**70**), Symonds and Chase (**170**), and others. Knight and Remers studied (1) the amount of attention given by college juniors in recitation, (2) the effect of social approval, and (3) the effect of normal class room motivation. Student opinions show "that the drift toward efficient attention habits follows tendency toward vocational curricula." Attention is generally low. In the second experiment freshmen fraternity pledges, previously subjected to a regime of humility and fatigue during their probation period were required to pass the Thorndike addition tests as a final criterion of acceptance. Their output was not appreciably decreased. Fifty-four juniors with under class room motivation alone, showed greatly reduced output as compared with the motivated group. It appears that the difference between genuine motivation and that intrinsic to the class room, offsets fatigue and differences of ability as well as doubles some kinds of work.

Two German questionnaire studies of children's opinions contribute certain data toward a comparison of motives. Usnadze (**187**) obtained the opinions of 660 boys and 950 girls of from ten to fifteen years of age as to the motives of preference in school studies such as science, language, history and literature. His subjects fell into two groups. The larger group, mostly boys, appreciate studies for their intellectual or practical values. The other groups, two-thirds girls, are determined by motives of an emotional order. Droege (**51**) asked 1,400 children of both sexes ranging from eight to fourteen years, to enumerate, rank in severity, and evaluate punishments used in school work. Young children mentioned only grosser forms of punishment. The conception of punishment expands with age. Girls stress remote, aesthetic and social effects, boys the immediate, physical or practical effects of punishment. With the foregoing may be compared the American investigations of Burr (**25**), who suggests methods of locating capable pupils, and supplying adequate motivation to school children, Robins (**144**), who tabulates work motives on the basis of students' themes and also suggests methods of securing adequate motivation, and Crawford (**38**), who determines incentives to study from a survey of the opinion of college students.

Laird (**103**) also studied incentives to high school and college work in this way. Ninety-two freshmen and sophomores reviewed

their high school careers listing and evaluating sixteen incentives active during that period. According to the students, "Reprimands, ridicule, sarcasm, low grades and additional assignments reduce efficiency while friendly conferences, parental pressure, commendation to parents or public, being excused from work, and being in love, increase efficiency." Again Laird (104) had college students list and evaluate their present incentives. The same incentives are suggested as in the first study. He concludes that "college students respond more earnestly to positive than to negative incentives." Students vary little in their response to the incentives mentioned. Such questionnaire studies may not only suggest relevant experiments but if multiplied in different countries, might yield useful conclusions as to racial and national factors conditioning the selection of motives for practical purposes.

We have summarized an experiment of Hurlock (86) partly devoted to a comparison of certain motivating attitudes of teacher or experimenter. Praise was found to be a more effective incentive than blame. Indifference was detrimental. Far more extensive and significant are the comparative studies of Vaughn (190) and Hamilton (70). Vaughn studied the effects of various types of instruction on behavior in seven experiments providing various degrees of warning against forbidden acts. The first five experiments involving 45 children and adults dealt with the effects of negative instruction on inhibition of arm movements, the extent and duration of which were recorded graphically. Subjects were instructed with increasing emphasis during the first three experiments and received electric shocks during the fourth and fifth. They were given 80 or 100 trials, divided into two series with positive and two with negative instruction. The sixth experiment compared the effects of positive and negative instruction of the "don't" type on steadiness of movement, eight adults serving. A seventh series of experiments with adults and children required the running of mazes. Vaughn found that types of instruction may be arranged in the following order of increasing effectiveness: (1) Positive verbal, (2) negative verbal, (3) indefinite threats, (4) definite threats, *i.e.*, threats accompanied by description or demonstration of consequences, (5) punishments actually administered which increase in effectiveness with the degree of certainty attached to them. Thus the certainty of punishment is the most efficient of inhibitory motives. There are individual differences and children are less influenced than adults, the unexperienced less than the experienced, while for all, the effects of instruction unaccompanied by punishment wear off rapidly.

Hamilton summarizes literature on the influence of punishment and reward as incentives and describes experiments with 60 women involving (1) the measurement of visual discrimination of length in the absence of other visual stimuli, (2) the automatic presentation of incentive stimuli which assume the aspects of reward or punishment according to the quality of performance in discrimination, and (3) the measurement of discrimination times without the knowledge of the subject. It was found that the attitudes of punishment and reward induced by the incentive stimuli differed little in effectiveness. Definite knowledge given in the absence of reward or punishment was less effective than the incentives without knowledge. The emotional character of the incentive attitude seemed to improve attention and perhaps facilitated the use of cues. The investigation thus throws light on the relative effects of intrinsic vs. extrinsic motivation in discriminatory activities.

The comparative value of individual and group motivation has been touched by Allport (**2**) who points out differences of behavior under respective conditions and Simms (**159**) compared the results of competition against one's own record or the records of others of equal ability with competition as a participant of group with another group. The competitive activities were substitution and rate of learning. Improvement occurred much more rapidly under individual motivation.

All of the experiments cited up to this point refer to the comparative value of different motives, but it is clear that comparison should be made between various motives or motivation as a whole and modifying factors of a different order such as practice and fatigue. A beginning has been made by Whiting and English (**216**), Crawley (**39**), and Symonds and Chase (**170**). Whiting and English studied the relation of motivation to fatigue, by means of various mental and physical tests of speed and accuracy applied to 16 Wellesley students. Three sets of experiments were carried out with the hope of determining the influence of incentives on the work decrement of fatigue. This was impossible since no work decrement appeared but the experiments showed that knowledge of results is an effective incentive.

Crawley obtained more positive results in fatigue experiments cited above. More work was accomplished in competition and with knowledge of results but "the extra exertion in the competition series was reflected in reduced output in the second work period, even after a four minute rest. The extra work produced by the incentive called for greater time for recovery."

Symonds and Chase (170) experimented to determine the relative efficacy of practice and motivation in learning. The materials were the Charter's diagnostic language tests involving the correction of sentences containing errors. The subjects were several hundred sixth grade pupils in New York schools. The tests were conducted (1) without motivation, *i.e.*, as school routine; (2) with test motivation (knowledge of results); and (3) with intrinsic motivation where an attempt was made to create a direct interest in linguistic improvement. The results show that amount of repetition is the most important factor in learning. Ten repetitions are more effective than any combination of three repetitions with motives. Intrinsic motivation caused no extra learning though well selected extrinsic motivation does. The authors think the chief function of motivation is to make practice acceptable. This conclusion can be accepted with limitations and more extensive comparisons are desirable.

Finally we may glance briefly at a number of studies which, while they are not experimental, raise problems for the experimental psychology of motivation or base their deductions upon its present development. Thus Hobson (74) discusses incentives in general in their relation to modern industry; Williams (220) stresses the favorable effect on workers of "a sense of being necessary"; and Tracy (178) in a *Preface to Scientific Humanism* urges the creative value of non-financial factors, such as pride of achievement, self-respect; and complete acquaintance with industrial purpose on the part of workmen. Stoops (167) and Myers (125) offer brief discussions of motives in industry. Coe (35) neglects the opportunity to develop a genuine psychology of religious and ethical motivation, but his emphasis on education, conditioning and habit formation is suggestive. Interesting also is the suggestion of Beth (13) that a state of anxiety may become a motivating force in religious consciousness and behavior. Vacca (188) opens up questions of motivation in relation to the operation of law and legal procedure; while Hurlock (89) develops the principles of motivation in fashion and dress from the results of extensive questionnaires. Serouya (154) analyzes forces at the base of group leadership in wartime, tracing them to a sense of group participation analogous to the sense of "mystical participation" ascribed to primitives by certain French sociologists such as Durckheim and Lévy-Bruhl. Finally W. F. Vaughan (189), writing in the Adlerian spirit, shows how compensation for inferiority may contribute to the development of power. He applies his theory to selected individuals, groups, and social movements, *e.g.*, radicalism of which Wolf (222) has also sketched the

motives. These works land us in the field of unconscious motives which is so far rather unsusceptible to exact experimental investigation, though the psychoanalysts may develop a method in time on the basis of their clinical studies. Studies of the Logic of the Unconscious such as that of Bradby (19) will aid in formulating experiments. As preparatory to extensions of the experimental psychology of motivation, we may cite Allport's study of motive as a concept in natural science, Hart on the transmutation of motivation and the profound theroetical treatise of Troland (183). Allport (5) shows that the vagueness of motivation is explicable in terms of the way in which the problem is approached. Hart (72) points out that the relativists' demonstration of the fundamental identity of all forms of physical energy, may be parallelled in the world of social forces, a conception which opens the way to a theory of the transmutation of human and social motives.

In the preceding pages we have attempted to classify and summarize all available studies of motivation in animal and human behavior. In the various sections these have been presented in an approximately chronological order which has revealed a steady improvement in technique and comprehension of the problems involved. Much work still remains. Certain forms of motivation have received insufficient experimental application. Others have not been investigated. In spite of a considerable number of comparative studies, no systematic attempt has been made to compare each motive with all the others and thus establish a provisional hierarchy of effectiveness within standard laboratory conditions. Very desirable also are studies on the effects of coexistent motives and their possible conflicts and combinations, since with every precaution secondary or subsidiary motives are apt to be present in any given experiment. Finally the question of social motivation requires approach from the quantitative standpoint to discover the effect of a group in various attitudes on the performance of other individuals or groups also varying in attitude. It is also necessary to experiment with groups varying greatly in numerical range.

Even at the present stage in the development of an experimental psychology of motivation we are perhaps justified in making certain statements of the nature of laws. Thus:

1. *The number of motives available for experimentation increases with the complexity and degree of development of the organism.*

2. *The energy of a motive varies directly with its primitiveness.* Thus punishment and the desire for food or sexual expression are more energetic than social motives.

3. *The degree of unity of motivating forces in any situation varies inversely with the intelligence of the motivated organism.*

4. *The effectiveness of a given motive in any situation varies directly with the number of coöperating motives or facilitating factors, and inversely with the number of competing motives or inhibiting factors.*

Other tentative laws might be hazarded, but we feel that the more pressing problem at present is the completion of the experimental program suggested by the extent literature of the subject.

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## SPECIAL REVIEWS

HENRI PIÉRON. *Principles of Experimental Psychology.* (Translated by J. B. Miner.) New York: Harcourt, Brace & Co., 1929. Pp. viii+190.

This volume presents a terse, moving account of scientific psychology. It is a general exposition and digest of the many detailed facts which are usually accessible only in voluminous handbooks. It is one of the more successful attempts to produce a popular handbook.

In this volume Professor Piéron shows himself to be one of the most progressive of the French psychologists. He writes from a definitely biological viewpoint, and at the same time acknowledges the accomplishments of structural psychology. The translator, J. B. Miner, says:

> "In France Professor Piéron has given prominence to the definition of psychology as the science of comportment (*comportement*). In 1907 and 1908 he was the first to revive the use of this word, which is rarely found in French or English. In the translation, the word *comportment* has been changed to *behavior*, which is the term in more general use. By doing so, it is possible that some advantage has been lost for the author's view which lays special emphasis on the organized, co-ordinated, integrated, and 'global' character of the phenomena studied by psychology. *Comportment* seems to convey something of the idea of individualized activity which is not found in the more common word *behavior*. It also has the advantage of distinguishing this form of behaviorism from more radical types."

Piéron himself says:

> "The idea that psychology is the science of behavior [*comportement*], of conduct, has been set forth by Pierre Janet, on the basis of his pathological studies, and by myself on the basis of researches carried out in a parallel manner on lower animals and man, showing the common laws of memory. The 'behaviorism' of Watson, on the contrary, has claimed—though with little justification—to establish a new psychology eliminating what may be ascribed to consciousness. The 'psychoreflexology'

of Bechterew corresponds to a purely verbal effort in the direction of eliminating any language contaminated with conscious signification."

The scope of the book is indicated by the following titles: Part One deals with "The Reaction Processes and the Forms of Behavior"; Part Two, "Affective Reactions and the Orientation of Conduct"; Part Three, "Perceptive Reactions and the Acquisition of Experience"; Part Four, "Intellectual Reactions and the Elaboration of Experience"; Part Five, "The Levels of Activity and the Utilization of Experience"; Part Six, "Mental Stages and Types."

There is an exemplary dignity exhibited in the introductory chapter; the tone is essentially one of pure science; the standard is strict. Piéron says:

> "It might be thought that psychology would at first develop as a science among physicians and then among naturalists. But in reality medicine has been impregnated with *a priori* concepts, from which it has had difficulty in freeing itself even in our time. It has been more philosophical and speculative than scientific and empirical. The naturalistic theorists, while giving an important place to facts, were preoccupied above all in constructing explanations which in general elude verification and remain, for the most part, purely philosophical (Lamarck, Darwin, Spencer)."
>
> "Experimental psychology in reality was born from physics. It was among research men, accustomed to the requirements of scientific method, that experimentation has been extended from external phenomena to the mental processes implied by the knowledge of these phenomena."

Piéron's biological interpretation of structural facts is well illustrated in his refreshing treatment of "Perceptive Reactions." Perceptive reactions are specific adaptations to definite objects, as contrasted with the vague affective reactions. The first appearance of specificity comes with the "pre-perceptive" reactions of expectancy and exploration which arouse the activities of attention and accommodation. The result is "'fixation' behavior" which in turn develops the specialized and simple reactions called sensations. It is only with difficulty, and artificially, that the elementary processes are made to function in relative isolation from the organic unity. The best method for the analysis is by the development of conditioned reflexes, rather than by "training which implies general modification of behavior." "In the phenomena of life we never see the elements

precede the complex, the parts existing before the whole." "The examination of the perceptions of an animal or of a child clearly shows the original existence of this 'syncretism,' as it is called, following Renan."

Piéron believes that sensory adaptations well indicate the objectivity and external reality of the exciting situations. In accord with this belief he cites with equal readiness evidence from introspection or evidence from the motor responses of man and animal. Thus he freely states that a "retinal image is only an element in the perceptive complex which expresses itself in attitudes and motor reactions"; that Titchener's "stimulus-error" is "a return to a natural attitude"; that in low organisms there is slightly varied affective reaction following sensory stimuli, but there are few adapted reactions implying sensory excitation; that in the problem of prior entry "a perception of simultaneity may be reached indirectly by proceeding to the motor reactions to the stimuli and giving attention to the kinaesthetic impressions"; that the psychophysical laws "appear in the form of a transformation of the external stimulus into a biological phenomenon"; that "space has interest and reality only as a place for motor activities."

Concerning Configurationism Piéron says, "Very many experiments, inspired by the theory, have clearly established the part played by general conditions—of the Gestalt—on various quite different perceptions of extension, movement, brightness, etc. But the theory goes beyond the facts. It gives to Form as such a value which is questionable, and it seeks to discover the causes, not in the acquisition of experience—individual or ancestral—but in the physiological organization and also in the laws of physical chemistry."

Despite the frequent allusions to response, Piéron reveals a lack of penetration into the underlying physiological problems. At least he presents merely at their face value references such as the one to Lapique's theory that "paths of nervous reflexes are prepared by a sympathetic tuning to various incoming paths." Concerning specific nerve energy he says, "On the physiological side, if the connections of the nerve fibers from the neurones in the end-organs—which are associated with groups of reactional neurons in order to assure suitable reflexes—are followed to the cortical elements, which are themselves connected to the elements of association conditioning mental reactions, it is found that the specific character persists through the entire length of the afferent pathways and is still manifested at the level of the cerebral centers."

Also, despite the frequent introduction of congenitally acquired responses Piéron heeds but slightly the widely discussed and as yet unresolved difficulties regarding inheritance. He says, "Biologists in general refuse today to admit the inheritance of acquired characteristics, of adaptive modifications arising in the course of an individual's life. But there are some results which point to the hereditary transmission of certain individual modes of behavior." This complete statement seems inadequate for covering the many cases presented by the author. He says, "What is called 'instinct' is a system of complex activity which shows itself, like a reflex response, on the first excitation, and which is found wholly prepared in the organism. It does not require individual acquisition of previous training." On the next page: "The fact that the appearance of a young girl excites a lively interest and agreeable emotion in an adolescent youth and sets up in him the desire to show off and to please her is due to the release of an instinctive activity."

This somewhat unhesitating use of "reflexes" and "instincts" diminishes the "experimental" tone of certain chapters.

This volume probably represents the most thoroughgoing attempt yet made to integrate the facts of biological development, stimulus-response observations and introspection. The net result will be found useful and suggestive.

W. S. HULIN.

*Princeton University*

V. M. BOROVSKI. *Principles of Comparative Reflexology.* Moscow and Leningrad: Giz, 1929. Pp. 200.

The reviewer is not satisfied with the name of the book. He would consider *The Neurophysiology of Behavior* or *of Organismic Action* a more appropriate title for a volume dealing primarily with the works of Lillie, Child, Magnus, Sherrington, Pavlov, and Lashley, and he would expect a great deal more material to be embodied in a text of comparative reflexology or comparative psychology. Outside the name, however, the book is excellent both in treatment and in point of view. The author, a leading Russian animal psychologist (not physiologist) is free from both the subjectivism of the zoöpsychologists of the school of Wagner and the "special" cerebral theories of "internal inhibition" and "brain mosaics" of the schools of Pavlov and Bekhterev. He is a reflexologist accepting the reflex—or whatever you call it—as the unit of neural and organismic organization, but is by no means bound to the many

gratuitous and often confusing assumptions of a good part of his fellow countrymen. Indeed, among other things, the following quotation from the present book would serve well to show how rash and uncritical a number of American psychologists and most German gestaltists are in lumping up all reflexologists with a *sine qua non* doctrine of isolated and restricted paths or connections: "The organism as a whole reacts to every stimulus but we study only the most obvious manifestations of its reaction. In other words, every reaction, no matter how simple, requires the integrated action of the entire nervous system" (p. 141).

The general plan of the book is as follows: In the introduction, the anatomy of the receptors, effectors, and of the nervous system is concisely sketched, the ground covered being the same as that in Chapters IV, V, and VI of Watson's *Psychology*. Part I deals with the theory and properties of the nerve impulse and with gradients in various tissues and at various levels of organismic development. The significant points in the works of Lillie, Loeb, Lapicque, and Child are clearly put forth. Part II considers the general properties of the reflex arc, and here Setchenov, Sherrington, and Adrian are the leading figures. Part III discusses simple coördination of reflexes in spinal animals and in invertebrates, and also goes into postural reflexes and into the nature of inhibition and of rhythmic processes. The experiments of Sherrington, Magnus, Verworn, Forbes, and Cannon are dwelt upon. Part IV is concerned with the coördination of reflexes in vertebrates and with problems of the final common path. Here, again, the works of Sherrington and those of Beritoff, G. Brown. and Ukhtomski are weighed. Part V takes up the question of individual modifiability. The contributions of Pavlov and Lashley are stressed mainly, although brief mention is made of the experiments of Vincent, Rogers, De Camp, and Kuo. A theory of conditioning which, in the reviewer's opinion, does not go far enough, but is an advance over Pavlovian theories, is propounded.

As it may be seen, a large part of the book is based upon American and English experimental literature. Truly, it is the most "Americanized" foreign text of psychology—even among Russian publications—that the reviewer has ever read. It also supplies a practical need of equipping the student of psychology with the basic neuroanatomical and particularly neurophysiological facts of behavior. A similar book in English—with the addition of the sounder knowledge of endocrinology—would be very suitable for classroom use in a course of physiological psychology, or the like, and would, at any

rate, prove to be of great value to most of our graduate students who either cannot or will not labor through scores of books and periodicals for such essential information.

H. S. RAZRAN.
*Columbia University*

ROBERT SAUDEK. *Experiments with Handwriting.* Morrow, 1929. Pp. 394+13+lxiii.

This volume is a vitally interesting attempt to analyze the structure of handwriting by utilization of modern instrumental devices such as cinematography and microphotography. It presents some experiments on the psychology of handwriting and develops a characterological analysis on the basis of graphic structure.

Maturity in handwriting, a basal concept, is approached by way of the development of graphic faculty in the child who is learning to write. By study of the developmental stages Saudek is able to determine the signs of slow or immature writing in adult writing. Graphic automatism, or the faculty of writing sentences without having to think of the details of execution, appears only when there is no doubt whatever as to the form of letters, unimpeded control of the instruments of writing, absence of all physical impediments, certainty as to orthography, and concentration of attention on the contents of the sentences written. As a basis of experimental graphology Saudek states that if even one of the conditions essential to automatic handwriting is temporarily absent, the handwriting in question declines from its complete maturity into a half mature or immature stage.

Since maturity issues in speed of writing it is necessary to determine the degree of rapidity with which a script is produced. This indeed is the "basic hypothesis for the psychological comprehension of writing." By appealing to a number of instrumental experiments by such investigators as McAllister, Judd, Drever, and Freeman, Saudek demonstrates the principles upon which he relies in his analyses, and formulates ten peculiarities of handwriting which are dependent upon certain natural laws of movement; for example, the fact that everyone writes long strokes in a quicker tempo than short strokes, and that the speed of writing alters when its direction alters. Cinematographic exposures of the act of writing are used to prove a number of the principles. The duration of each exposure is 1/25 of a second and the author suggests that the experimental graphologists express their gratitude to Freeman of Chicago for his analysis of graphic movement by using the term Freeman Unit (F. U.) to mean 1/25 of a second. Many cuts are reproduced to illustrate the

way in which handwriting may be analyzed by enlarged photographs and the slow-motion cinematograph.

In general, the principle is laid down that a rapid execution engenders an uncertainty of aim which reveals itself in the placing of the diacritical marks and reveals also the original directional intention of the movement. Saudek lists eight primary plus signs of speed and eight primary minus signs of slowness. The former include smooth and unbroken strokes and rounded forms; frequent signs of tendency to the right alternating with tendencies toward the left at the ends of lines where the end of the sentence occurs in one of the following lines; great uncertainty of aim after temporary interruptions of the act of writing; increased continuity of execution; curtailed and degenerated letters; primarily wide script; great difference of emphasis between up strokes and down strokes; widening of the left-hand margin as the writing increases. The primary minus signs of slowness are to some extent the contrary of the signs of speed. There are also secondary signs of the slowness or speed of execution; for speed, for example, rising lines, with paper and pen at normal angles, and a comparatively rare alteration of the hold.

Since all writing is essentially brain-writing, foot- and mouth-writing, right- and left-hand writing, are comparable. Saudek's exposition of this fact is illustrated by many most valuable cuts. He is able to demonstrate essential identities in spite of changed musculatures. Other valuable demonstrations include experiments which show that graphically mature penmen, able to read speedy hands rapidly, stumble over immature ones. On the contrary, the immature writer finds the mature hand illegible, the immature one easy to read. Aliens more easily read an immature foreign hand. Saudek also reports results of mass experiments with reference to changes that take place when handwriting is disguised. His tables here are to be compared with those of Meyer and Klages. His discussion of authentic and spurious expression should be of great value to the forensic graphologist.

Saudek asserts that honesty and dishonesty can be recognized from handwriting. Ten features of evidential value are listed, at least four of which must occur and reoccur to justify the diagnosis of dishonesty. The author reports the finding of such a complex of signs in every one of a collection of 141 manuscripts written by persons convicted of dishonesty in law courts. In further confirmation, he was able to select from a total of seventy-three handwritings furnished him by English manufacturers fourteen cases in which he

diagnosed dishonesty, a diagnosis confirmed in every case. Other successes were reported. In all, twenty-one cases of dishonesty were correctly diagnosed. No honest person was declared dishonest, but two cases were found in which dishonesty was not detected by the author's method. This report should be put to further test.

The least convincing of Saudek's expositions are those which concern characterological interpretations. The author's discussion of graphic retardation invites an application in terms of the signs of specific inhibitions in handwriting, such as uncertainty about spelling, latent sinistrality, uncertainty about sentence structure or content; but wide generalizations from such inhibitions seem dubious. The reviewer can find no psychological background for many of the characterological conclusions. Nor does a scanning of Saudek's earlier volume, "The Psychology of Handwriting," fill the lacuna. By what right does he conclude that a handwriting exhibiting only signs of motor speed would reveal a character "unrestrained and passionately fanatical, without any sort of internal restraint"? The author is careful to stress the fact that extremes occur rarely, and he furnishes frequent examples of penetrating analysis, but many of his analogies concerning motor expression and personality trends remain to be demonstrated.

JUNE E. DOWNEY.
*University of Wyoming*

A. S. OSBORN. *Questioned Documents.* Second Edition. Albany: Boyd, 1929. Pp. 1028.

The first edition of this book, referred to in the literature of the subject as a classic, appeared in 1910 and was soon exhausted, so that the second edition is welcomed by all those who are interested in handwriting, whether from a psychological, physiological, or forensic standpoint. The new edition of *Questioned Documents* is a rewriting of the first but with considerable elaboration of the contents. This elaboration is to a large degree concerned with the legal aspects of graphic problems. In fact, Part Two of the present edition—printed for the first time—consists of citations of discussions of the facts and the law of questioned documents from legal opinions, statutes, scientific books, law journals, and the like, and is designed for use in the investigation, preparation for trial, and trial of cases involving a questioned document. That the courts have progressed in their handling of graphic material is evidenced by the fact that stereoscopic photography is now admitted in a court of law although it was not admitted in 1910, and that nearly all the states, as well as

the Federal Court, today admit standards of comparison, a condition which was not generally true when the first edition appeared.

The second edition, as the first, contains descriptions and cuts of the instruments and appliances needed in getting accurate measurements of graphic details as well as instructions for use of them. The identification of handwriting and typewriting by means of enlarged photographs is amply illustrated. More than three hundred cuts appear in the new volume.

The treatment of handwriting is monumental from the author's specific point of view. While the psychology of handwriting is out side Osborn's domain, he includes a Form-Blindness test which has great psychological interest. His critical chapter on "Graphology and the Identification of Handwriting" has an excellent moral so far as popular faith in traditional graphology is concerned. Obviously graphology has failed to win a place in court procedures. An interesting and valuable chapter entitled "Individual Characteristics in Handwriting" indicates possible origins of many graphic eccentricities.

*Questioned Documents* is an invaluable reference work which should find a place in many libraries. The value of a considerable bibliography is enhanced by comments on the books listed.

JUNE E. DOWNEY.

*University of Wyoming*

LEONARD T. TROLAND. *The Principles of Psychophysiology*. New York: D. Van Nostrand Company, 1929. Pp. 429+xix.

This book appears as Volume I of a series of four projected treatises. It concerns itself with the definition of psychology, with the methods of psychophysiology and with perception. The second volume will have to do with sensation, the third with cerebration and action and the fourth with the ultimate theory of mind and matter. In the preface the author takes the reader into his confidence and tells him the motives which inspired the work. There were five: (1) to examine the foundations of psychology; (2) to formulate a plan of treatment which would include all factors "of real human importance"; (3) to present the most outstanding facts and theories of psychology; (4) to reconsider the relationship of mind and body from the philosophical standpoint; and (5) to formulate certain philosophical developments which result. Underlying all of these specific motives, however, is the firm intention to refute extreme behaviorism. The work "is presented as a detailed, demonstrative,

reply to the behavioristic contention that the introspective method in psychology is worthless."

But rather than a vehement polemic against behaviorism the author tries to effect "a reconciliation between the behavioristic and introspectionistic schools" hoping thus to help unify the progress of psychology. He does not in the least evade theoretical or even speculative problems but believes that present day psychology particularly needs this contribution. Of course it is easy and yet necessary to point out in this connection that the achievement which the author sets out for himself, mainly to offend none of the outstanding psychologists who have taken definite positions on controverted subjects, would be unique in the history of psychology. The conservative reviewer had heretofore hoped that if the clash of arms were to be done away with on the earth we might still retain, for awhile at least, the clash of words and thoughts. There is no doubt, however, that the coming decade in psychology is welcoming from several angles all whole-hearted attempts at peace between conflicting theories. To say that behaviorism and introspectionism are "artificial academic creations" is to deny in the next breath that the sciences, among which psychology hopes to maintain its position, are all "artificial academic creations."

The first section of Part I summarizes historical concepts in its attempt to define the present status of psychology. Psychology with and without the soul are treated consecutively, the latter both in its philosophical and psychophysical phases. We are then led into the modern contributions. Incidentally the reviewer would like to call attention to the fact that the name of Max Meyer, really the first behaviorist in this country, is omitted. The agreements between different types of psychology include two. Psychology should be primarily an inductive experimental science and that while relationships may be found with the body, the soul has been rejected as a scientific subject matter. The scholarly treatment of various present schools of thought as well as some of the historical antecedents is apparent throughout this section.

The last of Part I is taken up with the definitions and delimitations of psychology particularly the distinction between physics and psychology. It closes with a discussion of the concepts and methods of introspective psychology and the interpretation of psychical configuration. Experience is defined in terms of the physiological conditions under which it is found as follows:

> "Any individual experience is a distinctive system of elements and processes occurring in point-to-point correlation with the higher coördinative phases of nervous action in a waking, living organism."

It is also further defined by way of example in terms of sensible qualities, their arrangements and their relations. Consciousness becomes a cross-section of experience at any instant of time and "psychology is the systematic description of immediate experience in its own terms, and the formulation of its manner of determination by features of the physical system, or any other demonstrable factors lying outside of experience itself."

In general, the contrast between physics and psychology is the opposition between non-experience and experience but the reviewer does not follow the author when he says that "physics evidently abandons all data, as such, paying attention only to the inferences." There is some doubt in the reviewer's mind concerning the terminology here used since just before the author referred to "immediate experiential data upon which physical reasoning is partly based." The author maintains that the point of view and the data of both sciences are the same. The difference is that physics makes inferences from the data while psychology describes the data but makes no inferences from them.

Part II discusses the nature of the psychophysical relationship. It is interested chiefly in the conditions underlying experience which are both physiological, as far as the organism is concerned, and physical as applied to the environment. Various problems of the determination of consciousness, as such, are competently expressed. This applies to questions of the reflex arc as well as the integration of the entire neural mechanism. Several new formulæ expressing the functional relationship are advanced and defended.

The third part treats of perception in terms of consciousness and the world. Perception refers to "any object present to sense which is composed of two or more sensory qualities." Emphasis is placed throughout on the relation between consciousness and response and some attention is given to the intricate character or pattern of perception and its consequent response. The author offers us several new diagrams and his discussion of visual phenomena, as one may well expect from his previous authoritative publications in this field, are thorough-going and exceedingly helpful to the advanced student.

Some of the limens and much of the recent work in the field of sensory perception are treated for the first time in a systematic way.

The book will undoubtedly take its place on the semi-advanced level of instruction in psychology. The argumentation on the theoretical plane and many of the facts from experimental work are a little too intricate for the elementary student but the book is a valuable reference work for graduate and advanced undergraduate students. The reviewer seriously questions the pertinence of the title. In terms of the author's own definitions and in terms of the historical development of our science would not the title have been more aptly "The Principles of Physiopsychology" since etymologically the basic reference is not to physiology but to psychology?

CHRISTIAN A. RUCKMICK.

*University of Iowa*

DONALD A. LAIRD. *Psychology and Profits.* New York: Forbes, 1929. Pp. 272.

Professor Laird might have appropriately used as a subtitle for this volume "A Breezy Book for Business Men." That is its spirit. It is written for the executive who *needs psychology*—needs it so urgently that he cannot be put off with proposals for research or with tentative statements of "factors to be considered." He wants answers to his human problems, psychological answers, and answers he can understand. He wants common-sense *practical* psychology. And here it is.

"The chief way in which psychology can be of use to management . . . (is) in training the rank and file of executives to be better equipped to cope with their problems of manpower" (p. 20). Two facts are mentioned to demonstrate the value of this psychological training—(1) "more university presidents are drawn from this group (professional psychologists) than from any other group"; (2) "Dr. Hugo Eckener, commander of the Graf Zeppelin, was trained as a psychologist" (p. 21). Many practical principles growing out of the "psychological attitude" are scattered through the book. They include: "Practically every plant needs a good personnel cathartic in the form of a long discharge list to clean out poor timbers in the structure and to free the top minds of a heavy load of trying to work up courage [to do the firing]" (p. 64). And this sober judgment concerning craftsmen of the pre-machine period: "If they were craftsmen, then the Weary Willie who repaired my umbrella

last fall and drank a half dollar's worth of bay rum with the fee he earned was a craftsman. There may have been some craftsmen in these "grand-old-days-never-to-return" but I am afraid that if we keep our emotions quiet for a consideration of facts we shall discover that most of them were merely tinkers who botched most of their work and were utterly lacking in the skill that the real craftsmen of today must exercise to produce the perfect-working, standardized conveniences and luxuries you and I demand" (p. 73).

Certain "fragments from recent psychological research" in the field of differential psychology are also of interest. Among the bits of "startling information" are these: "Practically every person has some marked weak spots in his mental outfit, regardless of how accomplished or skilled he may be" (p. 79). "College professors do not have as much intelligence as most people think they have" (p. 80); "The oldest child is usually the most gifted in the family" (p. 84); "Almost anyone can make an average success in any occupation" (p. 85).

Of course the foregoing excerpts are not a fair sample of the book; they are quoted rather to illustrate the popular style and the fact that frequent slips do occur. They could be paralleled by many acceptable and well-expressed items of homely psychological and managerial wisdom. Effective anecdotal illustrations abound. Here and there definite results of psychological research are thrown in. The executive's attention is called entertainingly to the importance of selecting men with ability, arranging working conditions conveniently, and improving work methods, planning, eliminating distractions, encouraging employees' suggestions, avoiding worry, cultivating memory, and so on. All this material is discussed in a way that reflects intimate contact with business managers and their problems.

All in all Professor Laird has done rather well the thing he attempted. Psychologists may question the desirability of the attempt, as does the reviewer. But that need bother neither Professor Laird nor those business men who find the book entertaining, enlightening, or stimulating.

ARTHUR W. KORNHAUSER.

*University of Chicago*

## NOTES AND NEWS

BECAUSE of the interest which has been expressed in the visit of Prof. Henry R. Seager, of Columbia University, and his party to Russia last summer, plans are being made to organize a similar group to go to Russia during the summer of 1931. This party will meet in Berlin on July 6, 1931, and spend five weeks in Russia, visiting the industrial centers, financial institutions, schools, courts, workers' clubs, coöperative farms, museums and places of historical interest.

Anyone who is interested in joining this party should communicate with Roy H. Mackay, Columbia University, New York City.

DR. JOHN DEWEY, professor of philosophy at Columbia University and incumbent at Harvard University of the new William James Lectureship for the second half of the present academic year, has been chosen by the committee in charge of the Inglis Lectureship to give the Inglis Lecture for 1931, on the night of March 11. While at Harvard Professor Dewey will give a series of ten public lectures, and also seminary instruction to graduate students in philosophy.

PROFESSORS Guy T. Buswell and Louis L. Thurstone, of the University of Chicago will be among the lecturers in education at the summer sessions of the University of California.

DR. LOH SENG TSAI, Assistant Professor of Psychology at the Sprague Institute and Pathology Department of the University of Chicago Medical School, has been appointed by the Chinese Government to a research position at the National Research Institute of Psychology, Peiping, China.

BECAUSE of the large amount of material on hand and the resultant delay in publication, the Board of Editors of the Psychological Review Publications have decided to increase the size of the *Journal of Experimental Psychology* in an effort to relieve this situation. Beginning with the present 1931 volume, the *Journal of Experimental Psychology* has been increased 100 pages per year without change in the subscription rate.

DR. WALTER B. CANNON, George Higginson Professor of Physiology at the Harvard Medical School, who recently became a foreign honorary fellow of the Royal Society of Edinburgh, received on November 15 the degree of Doctor Honoris Causa from the University of Liege. On November 22 the same honorary degree was conferred on him by the University of Strasbourg.

A PROFESSORSHIP of experimental psychology will be created at the University of Cambridge, the present reader in experimental psychology, Mr. F. C. Bartlett, to be the first incumbent.

DR. WALTER B. CANNON addressed the Harvard Medical Society, on December 9, on "The Emotional Increase of Heart Rate."